

Biological Assessment/Evaluation for Threatened, Endangered, Proposed, Candidate/Sensitive Botanical Species;

Noxious Weed Risk Assessment; and Botanical Review of Survey and Manage Plant Species Report

Trinity Alps Wilderness Prescribed Fire Project

**Weaverville Ranger District, Shasta-Trinity National Forest
Trinity County, California**

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Introduction

The purpose of this document is to review the Trinity Alps Wilderness Prescribed Fire Project in sufficient detail to determine what the effects will be to federally listed plant species, plants listed as Sensitive by Forest Service Region 5 (Forest Service Manual 2670.31-32), plants listed as endemic to the Shasta-Trinity National Forest, plants listed as Survey and Manage under the NWFP, Watch List plants, and non-native invasive species. The findings of this report are summarized in Chapter 3 of the Environmental Assessment (EA). Survey and Manage species, Endemic species, and non-native invasive species are addressed in the Supplemental Report.

Project Summary

Location

The Trinity Alps Wilderness Prescribed Fire Project is located in the Shasta-Trinity National Forest, Trinity River Management Unit in Trinity, Siskiyou, and Humboldt Counties, within the Klamath Ranges of California. The project area encompasses the Upper New River, Eagle Creek, and Sixmile Creek 6th field watersheds comprising 58,349 acres or 11 percent of the Trinity Alps Wilderness. The proposed treatments, however, would occur in only three-to-four percent of the Wilderness area (see below). The project area consists primarily of federal lands with minor amounts of private inholdings.

The legal description of the project area is as follows:

Humboldt Meridian

- T70N R70E Sections 1 through 24
- T70N R80E Sections 6 and 7
- T80N R60E Sections 1, 11, 12, 13, 14, 23 and 24
- T80N R70E Sections 1 through 36
- T80N R80E Sections 4, through 9, 16 through 21, and 28 through 32
- T90N R60E Sections 24 and 25
- T90N R70E Sections 17 through 36
- T90N R80E Sections 29, 30, 31, and 32

Mount Diablo Meridian

- T370N R120W Sections 6, 7, 8, 17, 18, 19, 20, 29 and 30
- T380N R120W Section 31.

Elevations in the project area range from approximately 1,500 to 6,700 feet above sea level. Soils in the project area are primarily metasedimentary with the exception of 233 acres of serpentine in the southern portion of the project area and an additional 3,564 acres of ultramafic (FU1 and FU2 soil mapping areas) soil types dispersed throughout the area (see the project Soils Report). Serpentine or other ultramafic soils are of particular interest because approximately 15 percent of the plant species in California listed as

threatened or endangered occurs on this soil type.¹ Three major (accounting for more than 10 percent of the project area) regional dominance types, Pacific Douglas-Fir, Douglas-Fir – White fir, and White fir, account for approximately 74 percent of the project area. For further information on the project area vegetation types see the ‘Existing Conditions’ discussion in this report or the project Fire, Fuels, Air Quality and Vegetation report.

Alternative 2 - Proposed Action

Approximately 16,709 acres are proposed for treatment under Alternative 2 as part of the Trinity Alps Wilderness Prescribed Fire Project. Prescribed fire treatments were designed to meet desired conditions by increasing the landscape’s resilience to severe wildfire, restoring fire to the ecosystem, and decreasing surface and ladder fuels in strategic locations - such as major ridgelines - to help reduce fire risks and consequences. Implementation of the proposed action would likely occur over a period of approximately six to ten years.

Proposed treatments consist of maintenance of existing firelines and trails; and ignition of prescribed fire on ridge tops to create a mosaic burn severity pattern, primarily of low- to moderate-intensity surface fire. Prescribed fire lighting techniques would consist of aerial ignition (plastic sphere dispenser and/or helitorch) and/or hand lighting methods. Minimum Impact Suppression Tactics² and Forest Service Manual (FSM) 2324.23 direction for fire management activities in wilderness would be followed during all phases of implementation. In accordance with these two guides, the Forest Service would employ methods that cause the least amount of disturbance or alteration of wilderness characteristics that can be used safely and effectively to implement the proposed action. For further information, see the project Fire, Fuels, Air Quality and Vegetation report.

The timing of implementation would be determined based on current and predicted weather conditions, fuels conditions and compliance with State and federal air quality standards, with the intent to create primarily low- to moderate-intensity surface fires that would trend the project area toward the desired condition.

¹ Safford et al. 2005

² NWCG 2003

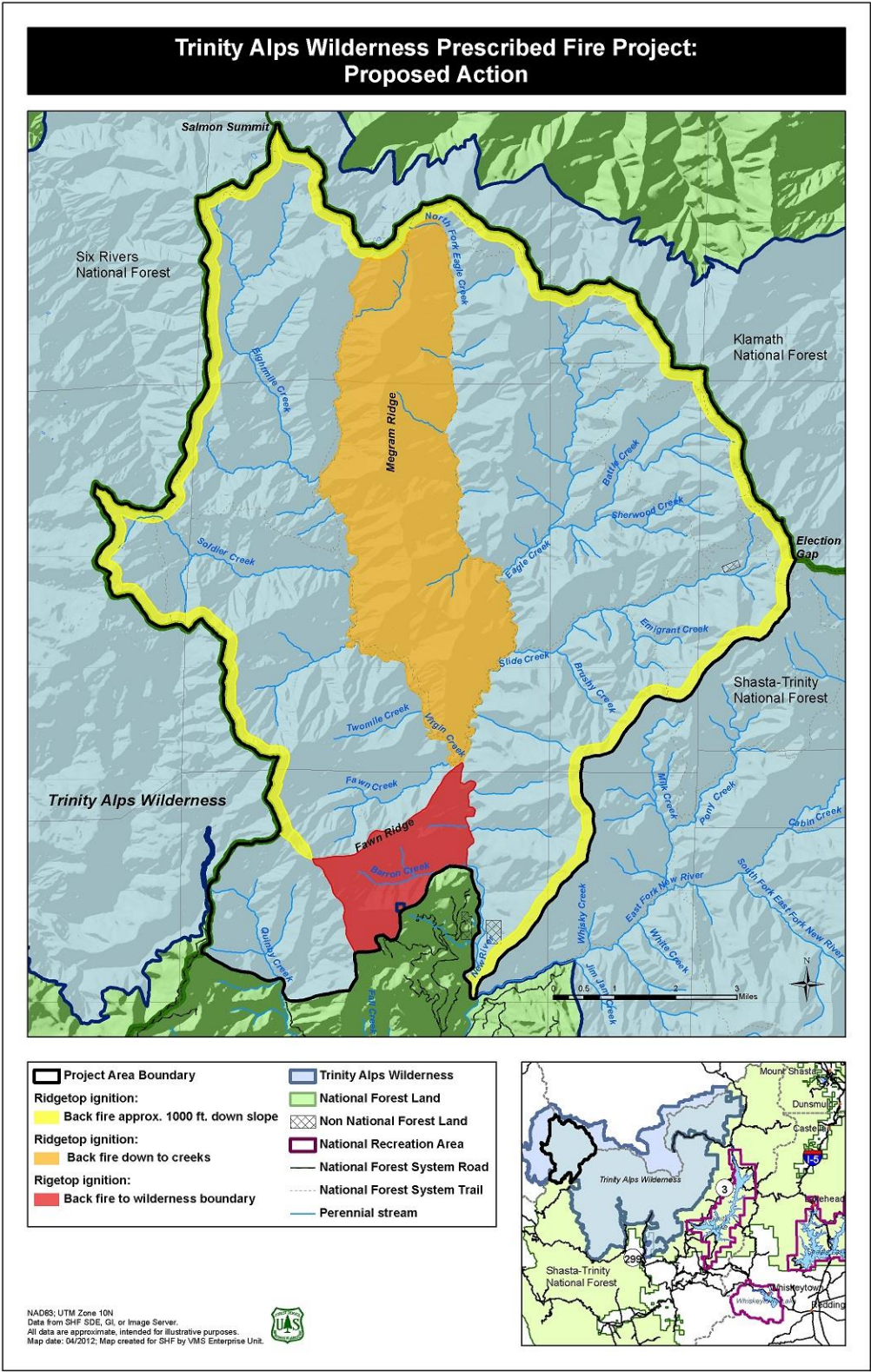
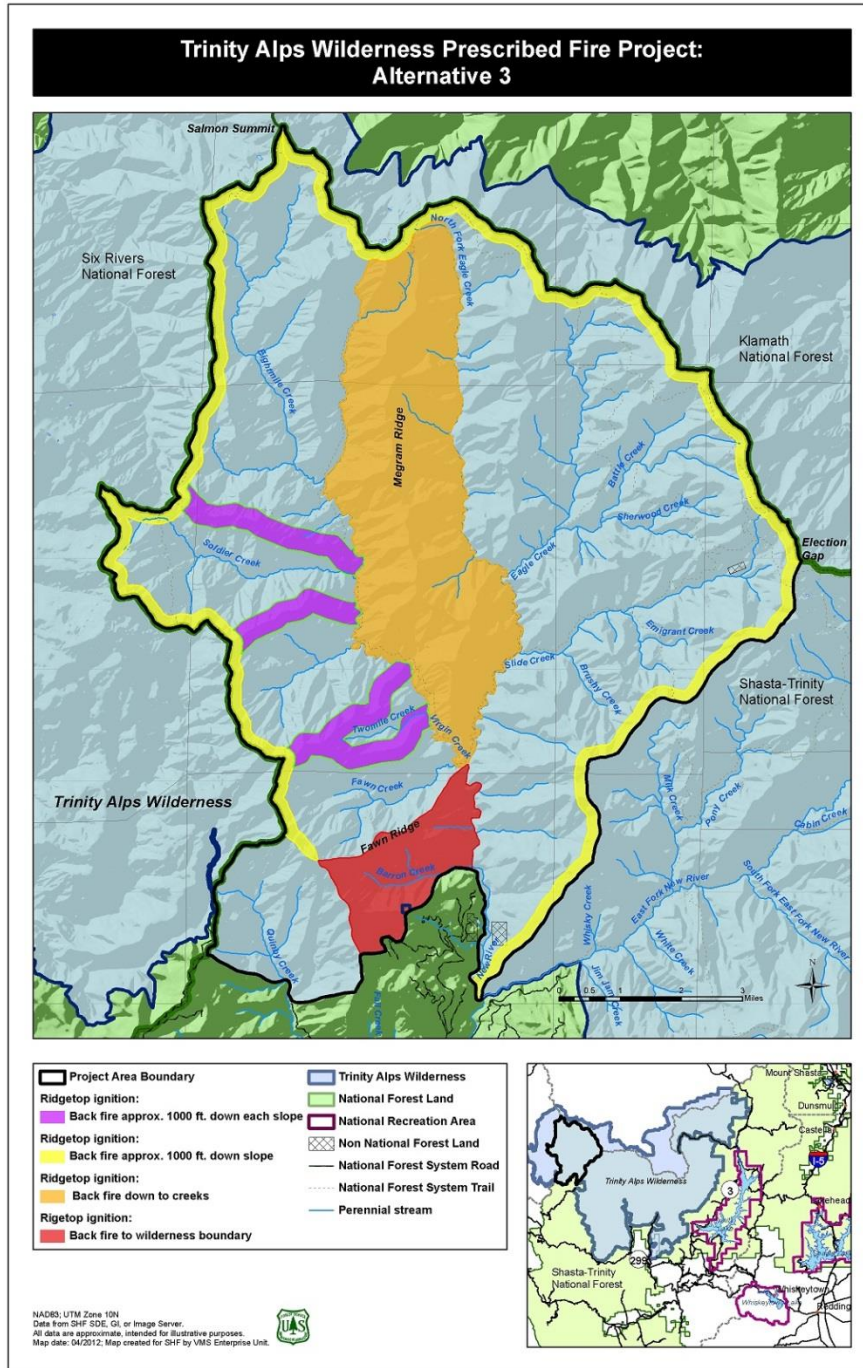


Figure 1. Proposed Action Alternative 2

Alternative 3 – Additional Treatment Areas

In addition to all of the treatments described above for Alternative 2, Alternative 3 would treat 2,379 acres in the Virgin Creek drainage, for a total of 19,088 acres of prescribed fire.

Figure 2. Proposed Action Alternative 3



Project Design Features for alternatives 2 & 3

Several project design features have been incorporated to minimize impacts to natural resources within the project area. All of these would reduce impacts to the botanical species considered in this report.

- No new fire line would be constructed.
- To minimize the potential for cumulative affects to botanical species when underburning, no more than ten percent of a sixth-field watershed would be burned in any one year.
- Broadcast and underburn prescribed fire would not be ignited within riparian reserves. Fire would be allowed to back into riparian reserves to promote a low-intensity backing fire.
- Retain existing down coarse woody debris (CWD) whenever possible, providing the amount of logs does not exceed fuel management objectives. At least 5 logs per acre should be retained, with 4 to 8 tons/acre of fuel remaining.
- Retain at least 50 percent duff and litter cover over the treatment area. If the soil and potential natural plant community are not capable of producing cover over 50 percent of the area, adjust minimum amounts to reflect potential soil and vegetation capacity.
- No burning between February 1 and September 15.

Regulatory Framework

Policy, Laws, and Direction

The following current laws, policy, and direction apply to the botanical resources Trinity Alps Wilderness Prescribed Fire Project:

- Forest Service Manual (FSM) 2600: Wildlife, Fish, and Sensitive Plant Management, Section 2670
- Forest Service Handbook (FSH) 2609.26: Region 5 Botanical Program Management
- California Wilderness Act of 1984 (Public Law 98-425 [98 Stat. 1624])
- Northwest Forest Plan Record of Decision (April 13, 1994)
- Wilderness Act of 1964 (Public Law 88-577 [16 U.S. C. 1131-1136])
- Clean Air Act of 1977 (Public Law 91-604 [42 U.S. C. 7401-7626])
- Section 7 of the Endangered Species Act [19 United States Code 1536(c)]

- National Environmental Policy Act of 1969 (Public Law 94-52 [42 U.S. C. 4321-4347])
- National Wildfire Coordinating Group (NWCG) Guidance on Minimum Impact Suppression Tactics (MIST) (June 6, 2003)
- Shasta-Trinity National Forest Land and Resource Management Plan and Record of Decision (April 28, 1995)

Land and Resource Management Plan

The Shasta-Trinity National Forest Land and Resource Management Plan (LRMP)³ provides four integrated levels of guidance: (1) Forest-wide direction, (2) Land allocations and Standards and Guidelines from the ROD, (3) Management Prescription Direction and (4) Management Area Direction.⁴

The following is specific direction found within the LRMP applicable to the Trinity Alps Wilderness Prescribed Fire project.

Forest Goals

Biological Diversity

- Integrate multiple resource management on a landscape level to provide and maintain diversity and quality of habitats that support viable populations of plants, fish, and wildlife.⁵

Threatened, Endangered, and Sensitive Species (Plants and Animals)

- Monitor and protect habitat for federally listed threatened and endangered (T&E) and candidate species. Assist in recovery efforts for T&E species. Cooperate with the State to meet objectives for State-listed species.⁶
- Manage habitat for sensitive plants and animals in a manner that will prevent any species from becoming a candidate for T&E status.⁷

Standards and Guidelines

Sensitive and Endemic Plants

- Map, record, and protect essential habitat for known and newly discovered Sensitive and endemic plant species until conservation strategies are developed.⁸

³ USDA Forest Service 1995

⁴ USDA Forest Service 1995 p. 4-1

⁵ USDA Forest Service 1995 p.4-4

⁶ USDA Forest Service 1995 p.4-5

⁷ Ibid.

⁸ USDA Forest Service 1995 p.4-14

- Analyze the potential effects of all ground-disturbing projects on Sensitive and endemic plants and their habitats. Mitigate project effects to avoid a decline in species viability at the Forest level.⁹
- Monitor the effects of management activities on Sensitive and endemic plants. If monitoring results show a decline in species viability, alter management strategy.¹⁰

Categories of Plant Species of Concern

Current management direction mandates conservation of several categories of botanical species on the Shasta-Trinity National Forest.

Endangered and Threatened species are those listed under the Endangered Species Act of 1973. There are no federally listed Endangered or Threatened plants known to occur on the Shasta-Trinity National Forest. On July 18, 2011, Whitebark pine (*Pinus albicaulis*) was designated as a candidate for federal listing by the U.S. Fish & Wildlife Service and has been added to Forest sensitive species list.

Sensitive species are those vascular plant, bryophyte, lichen, and fungi species eligible for listing under the Endangered Species Act, or whose viability is of concern. These are protected by USDA Forest Service regulations and Manual direction. The Region 5 Sensitive Plant List was updated and signed on July 3, 2013. For the purposes of this report, species determined by qualified Forest personnel to be eligible for Sensitive status – and therefore anticipated to be added to the Sensitive list before implementation of the project – were analyzed as Sensitive in the Biological Evaluation.

Forest Plan Endemic species are rare species confined wholly or mostly to the Shasta-Trinity National Forest. These are afforded the same protection as Sensitive species by direction in the Forest Plan.¹¹ If present, these species are addressed in the Supplemental Botanical Report.

Watch List species are those that do not meet the criteria to be included on the Regional Forester's Sensitive Plant List or the LRMP, but are of sufficient local viability concern to be considered in the planning process. If present, these species are addressed in the Supplemental Botany Report.

Survey and Manage botanical species are plant and fungi species associated with late successional old growth forests which provide microclimatic conditions and life support requirements to provide for the persistence of these species. The Bureau of Land Management and Forest Service have adopted standards and guidelines for the management of these habitats and species within the range of the northern spotted owl, commonly known as the Northwest Forest Plan (NWFP). The NWFP includes measures for management of known sites, site-specific pre-habitat disturbing surveys, and/or

⁹ Ibid.

¹⁰ Ibid.

¹¹ LRMP p. 4-14.

landscape scale surveys for rare and/or isolated species. The standards and guidelines for these mitigation measures are known as Survey & Manage (S&M).

The most recent Survey & Manage direction (USDA Forest Service 2014a) directs Agencies to follow the 2001 Record of Decision (ROD) for Amendments to the Survey & Manage, Protection Buffer, and other Mitigation Measure Standards and Guidelines (USDA Forest Service and USDI BLM 2001), and the December 2003 species list (USDA Forest Service and USDI BLM 2003), except for the red tree vole which remains a Category C. If present, these species are addressed in the Supplemental Botanical Report.

Analysis Methodology

General

Element occurrences of and potential suitable habitat for botanical species occurring in the Trinity Alps Wilderness Prescribed Fire Project area were assessed using the US Fish and Wildlife (USFWS) Information, Planning and Conservation System (IPaC), Natural Resources Information Systems (NRIS), California Natural Diversity Database (CNDDB) Element Occurrence Records, the California Native Plant Society (CNPS) online Inventory of Rare and Endangered Vascular Plants of California, current peer-reviewed literature, and personal communication with Shasta-Trinity National Forest botanical personnel. Queries were performed utilizing soils, elevation, and 2007 Existing Vegetation Geographic Information System (GIS) layers to assess potential suitable habitat for 'guilds' or groupings of species with similar habitat requirements in the project area (see Table 2). The Shasta-Trinity Land and Resource Management Plan (LRMP) was reviewed with respect to Management Direction to determine botany-specific guidance.

Additionally, GIS layers derived from fire and fuels analyses (see project Fire, Fuels, Air Quality and Vegetation report) were used for direct and indirect effects analyses. Fire intensity is the rate of energy release per unit length of flaming front. The amount of heat one would be exposed to per second while standing immediately in front of the fire. In general, fire line intensity data were used to estimate direct effects and crown fire potential data was used to estimate indirect effects; however, both layers were used for cumulative effects analysis. Vegetation severity data was derived from the Rapid Assessment of Vegetation Condition after Wildfire (RAVG) data¹² as well as the project Fire, Fuels, Air Quality and Vegetation report. The following describes vegetation severity definitions:

- **Unchanged:** One year post-fire the burned area is indistinguishable from pre-fire conditions. This does not always indicate that the area did not burn.
- **Low:** Areas of surface fire with little change in cover and 10-25% mortality of the structurally dominant vegetation.
- **Moderate:** There is a mixture of effects (low to high) on the structurally dominant vegetation and mortality 26-75%.

¹² <http://www.fs.fed.us/postfirevegcondition>

- **High:** Areas where the dominant vegetation has greater than 75% mortality.

One of the primary metrics used for assessing fire hazard or fire behavior is flame length. Flame length is an indicator of how hot or severe a fire can become and the level of difficulty fire managers will have in controlling a fire. Fireline intensity (measured in BTUs/sq. ft.) has also been modeled and provides a second correlation to resistance to control and potential fire effects. These metrics provide a means for assessing the potential for fires becoming difficult to suppress or contain, the potential to threaten communities at risk (i.e. wildland urban interface), and the potential to threaten natural and cultural resource values.

Cumulative Effects

Temporal Boundary

Cumulative effects for all botanical species were analyzed for past, current, and reasonably foreseeable actions and events. The general temporal boundary for past actions is 100 years (i.e. miscellaneous fires dating back to 1910) and reasonably foreseeable future actions limited to the next 20 years (see Table 1). The 20-year time period reflects the general boundary for the effectiveness of fuels treatments. General points, however, (e.g. successional trajectories) may be discussed (but not quantified) for a period of 80 years for botanical species requiring late-successional habitats for survival. Although stand development rates would vary depending on local conditions, the Northwest Forest Plan¹³ identifies old-growth forest conditions commencing in Northwest Forest Plan Forests at 80 years old.

Spatial Boundary

The cumulative effects analysis considers the project boundary (approximately 58,349 acres) as the extent of direct and indirect effects for the alternatives. The project boundary was chosen as the primary analysis area because this boundary provides the most comprehensive display of effects to vegetation conditions (overstory and understory) from implementation of the action alternatives and contains a large enough area to capture features such as landscape-level hydrology, soil types, etc. that may influence healthy vascular plant, lichen, bryophyte, or fungi populations. Additionally, any past, current, ongoing, or reasonably foreseeable actions whose effects overlap the project boundary in space and time were considered for cumulative effects. Therefore, the footprint of those actions may extend outside of the Trinity Alps project boundary (see table 1).

Resource Concerns and Measurement Indicators

No alternative-driving issues specifically related to botanical resources were identified through public scoping. One concern related to rare botanical resources was identified by the District Botanist through internal analysis. The concern and related measurement indicator is as follows:

13 USDA Forest Service and USDI Bureau of Land Management 1994

Resource Concern: Effects of the alternatives on rare plant populations and suitable habitat

Measurement Indicators:

- Predicted amount of fire line intensity and crown fire potential (as also measured by vegetation fire severity) in known Forest Sensitive botanical populations or suitable habitat.

Table 1. Past, current/ongoing and reasonably foreseeable future actions and events for the Trinity Alps Wilderness Prescribed Fire Project.

Activity	Description	Date(s)	Location	Scope
Miscellaneous fires	Wildfires	1910-1980	In and adjacent to the project area	38,120 acres within wilderness, 768 acres within project area
1987 Complex	Wildfires	1987	Throughout the wilderness but outside the project area	35,252 acres within wilderness
Megram	Wildfire	1999	Mostly within but also adjacent to project area	70,351 acres within wilderness, 49,008 within project area
Bar Complex	Wildfire	2006	In and adjacent to project area	94,596 acres within wilderness, 7,460 within project area
Iron Alps Complex	Wildfire	2008	Portions within project area, portions outside project area but within wilderness	30,548 acres within wilderness, 3,708 acres within project area
Backbone (including Redspot and Trinity Fires)	Wildfire	2009	Mostly within but also adjacent to project area	5,162 acres within wilderness, 4,501 acres within project area
Corral Complex	Wildfire	2013	Mostly outside the project area, portions adjacent to or within the project area	Approximately 800 acres within the project area, 125 acres within proposed treatment areas
River Complex	Wildfire	2015	Mostly outside the project area, portions adjacent to or within the project area	Approximately 6,055 acres within the project area, 2,285 acres within the proposed treatment areas
Trail Use and Maintenance	Trail maintenance activities according to wilderness management direction (FSM 2323.13f)	Past, current and ongoing	Throughout the wilderness, including within and outside the project area	Approximately 71 miles of trail within the project area, of which 55 miles have been maintained within the last 5-10 years.
Wildfire suppression	Suppression of naturally occurring wildfires	Past, current and ongoing	Throughout the wilderness, within and outside the project area	Fires have occurred on ~65,000 acres within the project area since 1910 (including acres re-burned), with varying levels of active suppression.

**Acres within the scope column are approximate.*

Existing Condition

General Vegetation

Vegetative conditions within the project area are departed from historic conditions, with species composition favoring shade tolerant species. On a landscape level, forested stands are generally denser, and overall tree size is restricted by inter-tree competition. White fir reproduction that would have been killed by frequent surface fires has been allowed to grow for the last 90 years and is transitioning from the understory into an overstory dominant due to its ability to quickly garner site resources, namely available soil moisture.¹⁴ Site quality has not appreciably changed from historic times, but rather the disturbance regime has changed. Absence (suppression) of low intensity fires that would have generally consumed surface fuels (downed wood) and live fuels (ladder fuels) has resulted in denser surface fuels, and live fuels have increased. Additionally, approximately 23% of forested areas within the project area are considered ‘non-stocked’ due to past fire events.¹⁵

The vegetation in the Trinity Alps project is primarily of tree-dominated stands, both conifer and hardwood. Tree dominated stands account for approximately 50,406 acres, or 86% of the project area boundary. Regional dominance types accounting for greater than 10% which is at least 5,835 acres of the project area that are considered ‘major’ for the purposes of this report. These include only three regional dominance types and they are described below. The Pacific Douglas-Fir Alliance accounts for approximately 27,607 acres, or 46 % of the project area. The Douglas-Fir – White fir Alliance accounts for another 8,653 acres, or 15% of the project area, and the White fir Alliance takes in another 7,642 acres, or 13% of the project area. These three major regional dominance types approximately 74 percent of the project area. This data documents that the project area is primarily a forested habitat.

The remaining acreage consists of other coniferous forest types (12 percent), hardwood forest/woodland (6%), shrubs and chaparral (seven percent), and grasses, wet meadows, or barren areas (1%). For a complete list of regional dominance types (and acres) within the project area refer to the project Fire, Fuels, Air Quality and Vegetation report.

Fuels Condition

In some cases, numerous snags were felled in during past (1999-2015) fires for the construction of indirect fire suppression lines, which the fires never reached, and in which no other fuels mitigations were implemented. These lines now have heavy accumulations of large dead and downed woody debris. Fuel conditions found over vast amounts of the project area have an increased loading of snags, sometimes mixed with dense brush, and the presence of dead and down woody material on the forest floor. See project Fire, Fuels, Air Quality and Vegetation report for further information.

¹⁴ Agee and Skinner 2005

¹⁵ For potential vegetation condition changes based on the 2015 River Complex, see the Fire and Fuels report

Threatened, Endangered, Proposed, and Candidate Botanical Species

This section is prepared in accordance with the legal requirements set forth under Section 7 of the Endangered Species Act [19 U.S.C. 1536 (c)], and follows the standards established in the Forest Service Manual direction (FSM 2672.42).

The most recent official USFWS lists were generated September 21st, 2018 utilizing the agency's Information, Planning and Conservation System (IPaC) —project consultation codes 08EYRE00-2018-SLI-0242 (Yreka Fish and Wildlife Office) and 08EACT00-2018-SLI-0402 (Arcata Fish and Wildlife Office). Table 2 below is a summary of the species on these lists. Because the list request was made by delineating a large polygon encompassing the project area there are species or habitats included on the list that may not be found in the project area.

Table 2. Threatened, Endangered, Proposed, and Candidate plant species analyzed for the Burnt Ranch Fire Resilient Community Project (IPaC list, USDI FWS 2018)

Scientific Name	Common Name	Category	Habitat	Known from Project Area	Rationale for Analysis Consideration
<i>Arabis macdonaldiana</i>	McDonald's Rock-cress	E; no CH	Serpentine slopes in Red Mountain area	No	Out of geographic range
<i>Chamaesyce hooveri</i>	Hoover's spurge	T; CH	Vernal pools	No	No Habitat; Out of geographic range
<i>Fritillaria gentneri</i>	Gentner's Fritillary	E; no CH	Dry woodland	No	Out of geographic range
<i>Orcuttia tenuis</i>	Slender Orcutt grass	T; CH	Vernal pools	No	No Habitat; Out of geographic range
<i>Pinus albicaulis</i>	Whitebark pine	C, no CH	Subalpine forest	No	Analyzed

The Trinity Alps Prescribed Fire Project is not within the range and/or habitat of any of the aforementioned species except *Pinus albicaulis*. Since *Pinus albicaulis* (whitebark pine) is a candidate species it receives no statutory protection under the ESA, and is listed as Forest Service Sensitive (FSS). Therefore it is analyzed within the BE portion of this report.

No populations of any federally listed botanical species have been recorded in botanical records or identified in previous surveys within the analysis area. No critical habitat is established for these species in the analysis area. Due to this and a lack of suitable habitat or range, there will be no direct, indirect or cumulative effects to these species. Additionally, there are no activities that are interrelated or interdependent to the proposed action that will affect these species. Therefore, there will be no effects to compare between alternatives for this project in this section.

Determination of Effects

It is my determination that the Trinity Alps Wilderness Prescribed Fire Project will not affect *Arabis macdonalidiana*, *Chamaesyce hooveri*, *Fritillaria gentneri* or *Orcuttia tenuis*. For a determination of effects for *Pinus albicaulis* see the Sensitive species discussion in the BE.

Compliance with law, regulation, policy, and the Forest Plan

The Burnt Ranch Fire Resilient Community Project complies with Section 7 of the Endangered Species Act of 1973, as amended, and Forest Service Policy (FSM 2670).

Sensitive Botanical Species Habitat Guilds

Guilds are generalizations of habitat and reflect the grouping where species are discussed in the report. It is recognized that certain species may occur both within and possibly beyond the boundaries of these guilds. Further refinement of species' habitats is discussed where appropriate.

Table 3 displays four guilds identified within the project area. Although there are other vegetation types within the analysis area (see project Fire, Fuels, Air Quality and Vegetation report), these guilds represent the main areas where Forest Service Sensitive botanical species are likely to occur.

The soils shapefile layer from the Shasta-Trinity NF GIS Library extrapolated the Serpentine acres. Rocky outcrop acres were quantified by outcrops within a coniferous forest overstory, coniferous forest acres (e.g. Douglas-fir Ponderosa Pine, Douglas-fir White fir, Knobcone Pine, Mixed Conifer- Pine, Mixed Conifer-Fir, Pacific Douglas-fir, Ponderosa Pine, Red fir, Subalpine conifer, White fir) not overlapping with a 'non-stocked' overstory diameter class (from past fire events). The parameters for calculating the Late-successional coniferous forest guild were: coniferous regional dominance vegetation type, overstory tree diameter of medium or large trees, hardwood cover less than 50 percent and conifer cover equal to or greater than 50 percent¹⁶.

Riparian or wet meadow acres were assessed using the following regional dominance types: Wet Meadows, Riparian Mixed Shrub, Riparian Mixed Hardwood, Willow, and Willow-Alder. There may be other microsite areas along streams within the project boundary that would qualify for perennial riparian habitat conditions therefore, these acres are likely underestimated.

Table 3. Habitat guilds and their approximate acreage within the Trinity Alps Wilderness Prescribed Fire Project area.

Guild/Habitat Type	Acres in Project Area	Acres in Alternative 2 Treatment Areas	Acres in Alternative 3 Treatment Areas
Serpentine (ultramafic soil)	3,979	1,177	1,289
Rocky Outcrops	38,006	10,624	12,184
Late-successional coniferous forest	18, 868	4,944	5,620
Riparian/Wet Meadow	115	19	45

¹⁶Vegetation type and cover values were drawn from the 2007 Evveg gis layer and the Vegetation report

Trinity Alps Wilderness Prescribed Fire Project:
Serpentine

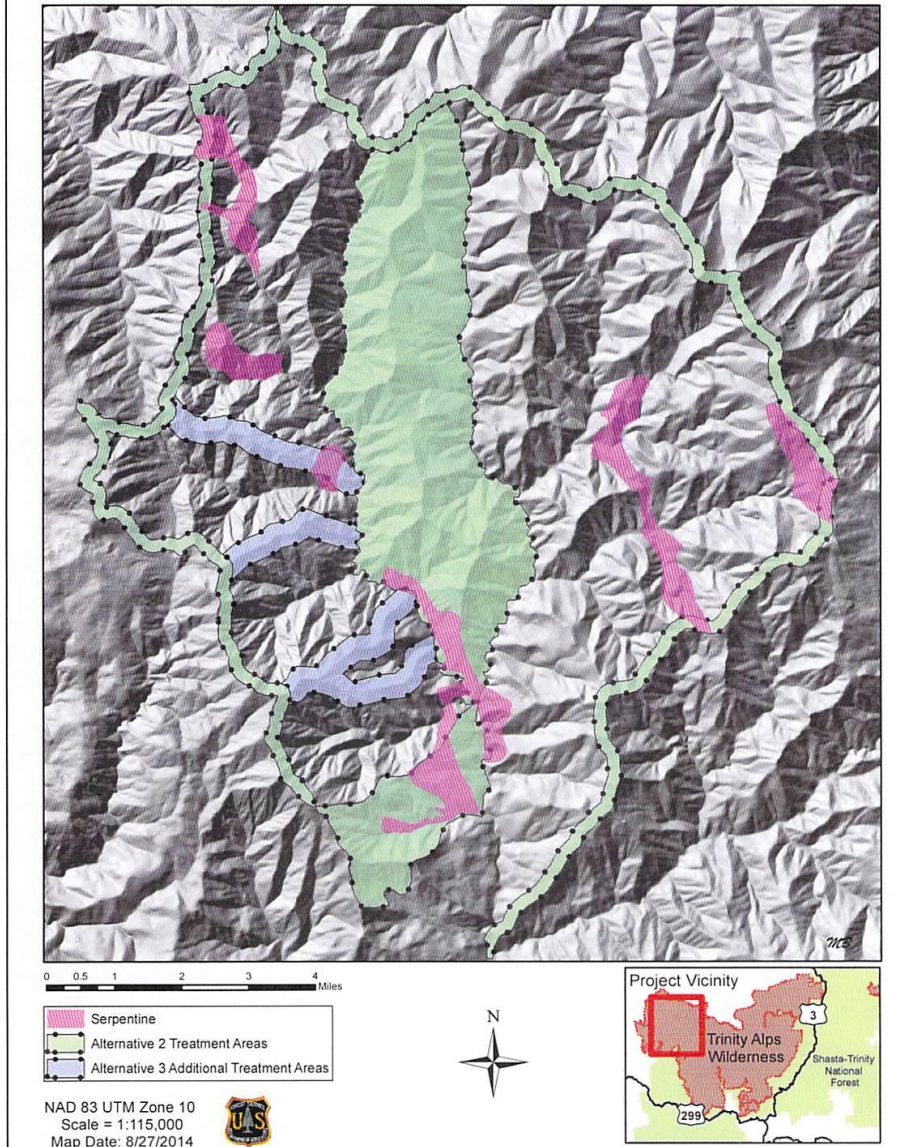


Figure 3. Serpentine Guild for both Action Alternatives

Trinity Alps Wilderness Prescribed Fire Project: Serpentine

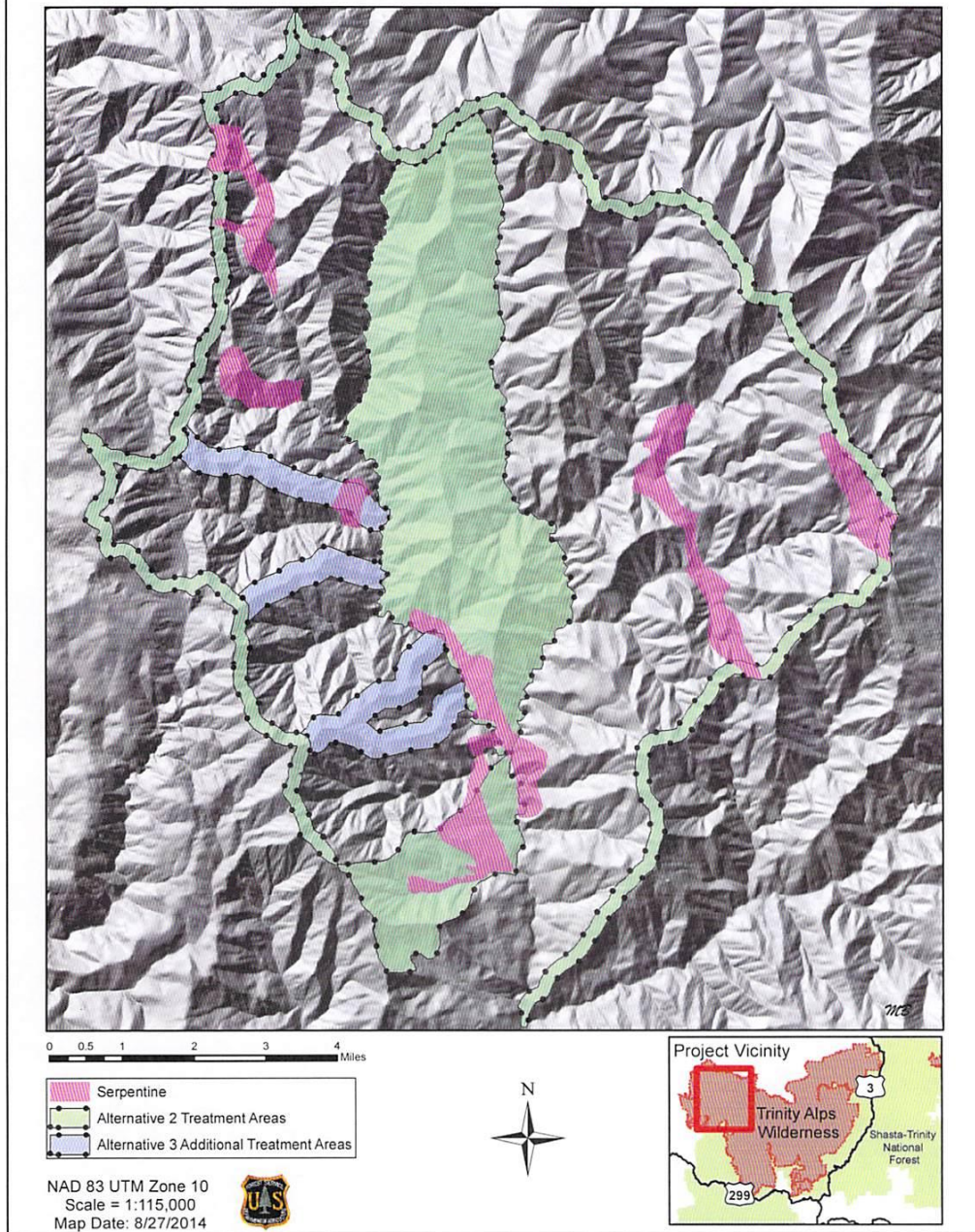


Figure 4. Rocky outcrop guild for both Action Alternatives.

Trinity Alps Wilderness Prescribed Fire Project: Late Successional Coniferous Forest

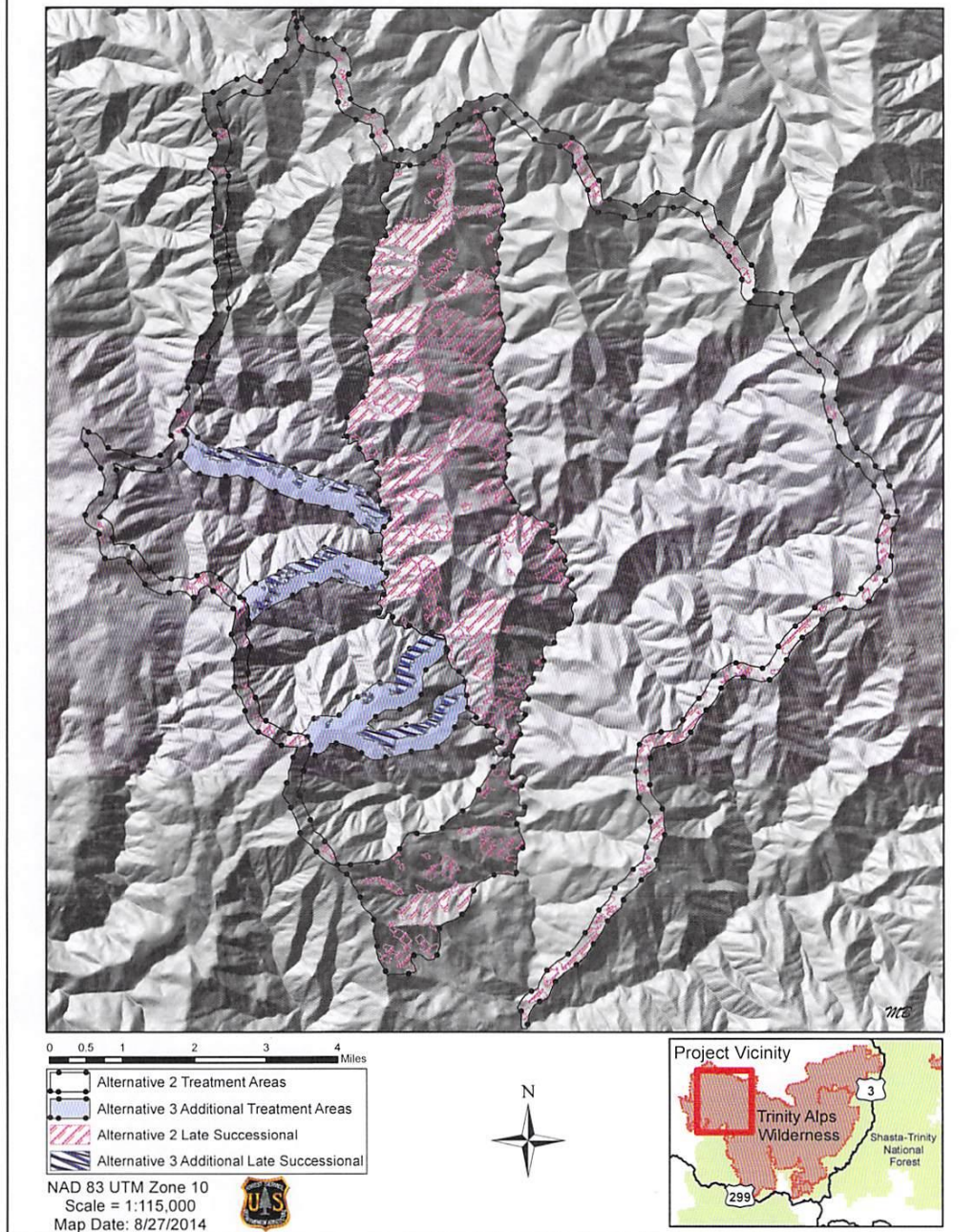


Figure 5. Late successional forest guild for both Action Alternatives.

Trinity Alps Wilderness Prescribed Fire Project: Riparian/Wet Meadow

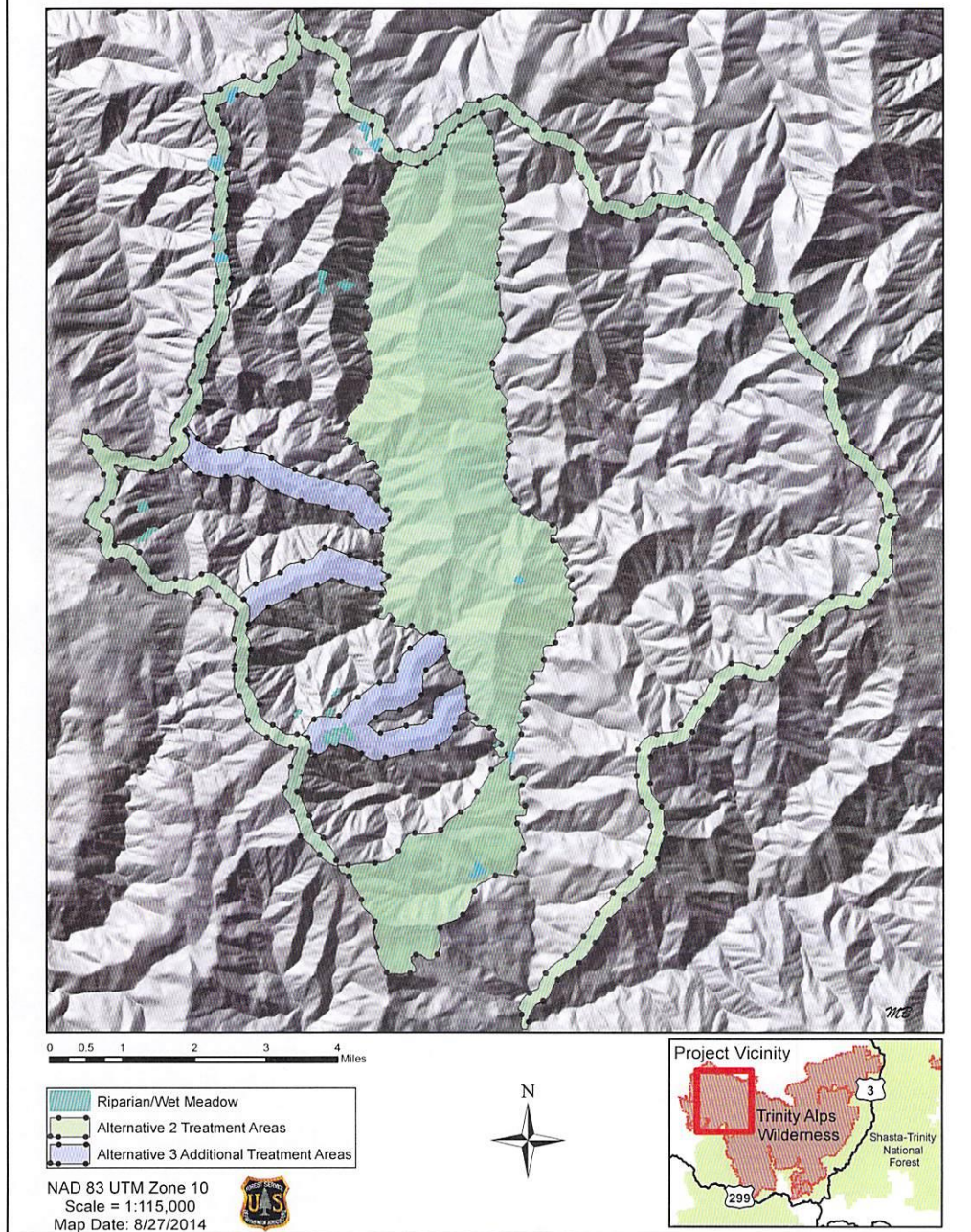


Figure 6. Riparian/wet meadow guild for both Action Alternatives.

Table 4 displays Sensitive botanical species based on the 2013 R5 Sensitive Species List (USDA Forest Service 2013b) that could potentially occur in the Trinity Alps Wilderness Prescribed Fire project as determined by the presence of suitable habitat. Refer to Appendix A for selection criteria and rationale.

Table 4. Sensitive Species potentially occurring within the Trinity Alps Wilderness Prescribed Fire Project area.

Scientific Name	Common Name	Organism	Habitat	Guild(s)
<i>Anisocarpus scabridus</i>	scabrid alpine tarplant	vascular plant	rocky, open subalpine slopes	Rocky outcrops
<i>Botrychium</i> subg. <i>Botrychium</i> and subg. <i>Osmundopteris</i>	moonwort	vascular plant	conifer forest and wet meadow edges	Late-successional coniferous forest/Riparian or
<i>Campanula wilkinsiana</i>	Wilkins' harebell	vascular plant	streambanks in red fir and subalpine forest	Riparian or Wet meadow
* <i>Chaenactis suffrutescens</i>	Shasta chaenactis	vascular plant	rocky slopes on ultramafic soils	Serpentine/Rocky outcrops
<i>Cypripedium fasciculatum</i>	Brownie lady's-slipper	vascular plant	mixed conifer forest	Late-successional coniferous forest
<i>Cypripedium montanum</i>	mountain lady's-slipper	vascular plant	mixed conifer forest	^a Late-successional coniferous forest
<i>Epilobium oregonum</i>	Oregon willow herb	vascular plant	stream banks, meadows, bogs, ultramafic soils	Serpentine/Riparian or Wet meadow
<i>Eriogonum ursinum</i> var. <i>erubescens</i>	blushing wild buckwheat	vascular plant	rocky open ridgelines	Rocky outcrops
<i>Erythranthe trinitensis</i>	pink-margined monkeyflower	vascular plant	serpentine seeps, meadow edges, roadsides	Serpentine
<i>Iliamna latibracteata</i>	California globe mallow	vascular plant	coniferous forest and streamsides	^a Riparian or Wet Meadow
<i>Ivesia pickeringii</i>	Pickering's ivesia	vascular plant	ephemeral drainages in mixed conifer forest, ultramafic	^a Serpentine
<i>Lewisia kelloggii</i> ssp. <i>hutchisonii</i>	Hutchison's Lewisia	vascular plant	Decomposed granite, slate, volcanic rubble, in upper montane and	Rocky outcrops
<i>Parnassia cirrata</i> var. <i>intermedia</i>	fringed grass-of-Parnassus	vascular plant	wet areas, lake edges in ultramafic soils	Serpentine/Riparian or Wet meadow

Scientific Name	Common Name	Organism	Habitat	Guild(s)
<i>Penstemon tracyi</i>	Trinity Penstemon	vascular plant	Upper montane coniferous forests in exposed rocky	Rocky outcrops
<i>Pinus albicaulis</i>	Whitebark Pine	vascular plant	Dry, rocky mountain sides; subalpine and alpine zones	Rocky outcrops/ Late-successional coniferous forest
<i>Raillardella pringlei</i>	showy raillardella	vascular plant	stream banks, meadows, bogs, ultramafic soils	Serpentine/Riparian or Wet meadow
<i>Sedum paradisum</i> subsp. <i>paradisum</i>	Canyon Creek stonecrop	vascular plant	rocky outcrops in forest openings	^a Rocky outcrops
<i>Streptanthus oblongolatus</i>	Trinity River Jewelflower	vascular plant	steep metavolcanic bluffs in woodlands	Rocky outcrops
<i>Buxbaumia viridis</i>	bug-on-a-stick	bryophyte	perennial riparian habitat in conifer forest	Late-successional coniferous forest/Riparian or Wet meadow
<i>Peltigera gowardii</i>	Goward's water fan	lichen	perennial cold water streams	Riparian or Wet meadow
<i>Sulcaria badia</i>	Bay Horsehair Lichen	lichen	Open white oak grassland or mature Douglas-oak forest	Late-successional coniferous forest
<i>Dendrocollybia racemosa</i>	branched collybia	fungus	organic leaf matter in mature conifer forest	Late-successional coniferous forest
<i>Phaeocollybia olivacea</i>	olive phaeocollybia	fungus	mixed conifer forest containing oak or pine	^a Late-successional coniferous forest
<i>Boletus pulcherrimus</i>	Red-pored bolete	Fungus	Mature or late-seral Douglas-fir forest with hardwoods	Late-successional coniferous forest

*populations identified in project area

^a species found primarily within, but not limited to, this guild

Recent botanical surveys, however, have not taken place therefore the presence of many species is unknown. Suitable habitat was assessed for the project area and associated botanical species presence was assumed.

Species Accounts

Information for botanical species accounts is primarily derived from Nakamura and Nelson (2001), California Natural Diversity Database (CNDDB), NatureServe, California Native Plant Society (CNPS) Natural Resource Information Systems (NRIS), and Shasta-Trinity NF species accounts. The following global and state ranks included in the

following accounts are based on the CNDDDB Standard. See Appendix B for further rare plant ranking descriptions.

Bay horsehair lichen (*Sulcaria badia*) is rare fruticose epiphytic lichen endemic to the western North America. The distribution ranges from the Olympic Peninsula in Washington in the north to the general area of Laytonville, California to the south. There are two new sites found in Shasta Trinity in 2014 at Forest Glen and Lake Mountain Ranch. Of the two sites on the Shasta-Trinity, the Lake Mountain Ranch location most resembles Six Rivers National Forest habitats, being especially similar to locations on Waterman Ridge. But with more California location information and more surveys, it is becoming clear that the habitat of *Sulcaria badia* locations in California outside of Six Rivers conforms to the habitat described from Oregon: open well-lit mixed hardwood/conifer forests where *Quercus* (or *Notholithocarpus*) spp. are present, with maximum elevations in the range of 2500 – 3000 feet.

Threats to this species would be any activity that would cause the loss of a substrate tree, or activities that cause impacts to the light or moisture regime to a high degree (Carlberg 2014), and air pollution (Peterson et al. 1998) may threaten this species. The closest known occurrence is approximately 10 miles west of the project area.

Blushing wild buckwheat (*Eriogonum ursinum* var. *erubescens*) is a perennial subshrub ranked G3G4T2 S2.3. This species grows primarily on north-facing slopes of open, rocky ridge tops, on shallow, well-drained soils formed from metavolcanic and metasedimentary rocks between 4,700 and 6,200 feet elevation. Blushing wild buckwheat is known from Siskiyou, Trinity and western Shasta counties. Populations can range from 10-20 plants, to several hundred, and occur on mixed ownerships (private and public). Currently CNDDDB data layers show 36 documented occurrences of this species in California.

Threats to this species include: noxious weed spread, habitat displacement, ATV use, and possibly road construction and maintenance. There are no known occurrences of this species in the project area. The closest known occurrences is over 26 miles to the west.

Branched collybia (*Dendrocollybia racemosa*) is a fungus species that is widespread in the northern hemisphere but rare in California. It has a rank of G2G3 S1S2.

This species is a mycoparasite (parasitizes other fungi) fungi whose hosts are fleshy mushrooms in forest settings (NatureServe 2015). Recent studies have found the fungi genus *Russula* to be a confirmed host (Machnicki et al. 2006). Branched collybia produces sclerotia (long-lasting asexual reproductive structures) that allow it to last in the soil and duff layers, under suitable environmental conditions, until an appropriate fungal host fruits. Sites located in California since 2007 were primarily associated with Douglas-fir and white fir, in mid-mature and late mature/old growth stands. Elevation range is 1672-3608 feet.

Threats to this species include activities such as logging or high-severity fire that may negatively impact the host, general habitat, microclimates, and/or host's substrate or symbiotic partner. There are approximately 15 documented occurrences of this species in

California. The closest known occurrence to the project area is approximately 7 miles to the south.

Brownie lady's slipper (*Cypripedium fasciculatum*) is a wide ranging but rare western North American orchid. It has a rank of G4 S3.2 and is found in eight western states. In the drier part of California, populations tend to be small and confined to relatively moist habitats, especially within older forests along riparian corridors.

Known threats to this species include logging and other vegetation reduction which would dramatically increase sunlight exposure, excessive grazing, and exclusion of wildfire. There are over 800 occurrences of this species documented in California, 45 known populations are on the Shasta-Trinity National Forest, 37 of which are in Trinity County. The closest known occurrence to the project area is approximately 7 miles to the southwest.

Bug-on-a-stick (*Buxbaumia viridis*) is a bryophyte that occurs throughout the world, and in six northern and western states. Bug-on-a-stick grows on large diameter downed logs within perennial riparian habitats in coniferous forests. It is ranked G3G4 with no California state rank assigned yet. Three hundred occurrences are known globally; it is considered secure, but very rare in California.

Known threats include canopy removal, removal or loss of large, coarse woody debris, and activities that reduce stream water abundance, such as logging, fuels reduction, and road construction. There are only nine known occurrences in California, with one known from the Shasta-Trinity National Forest, about 20 miles outside the project area near Eagle Ranch on the Trinity River Management Unit. The other populations from California are known from the Siskiyou, Six Rivers, Modoc, and Plumas National Forests.

California globe mallow (*Iliamna latibracteata*) is a perennial herb that grows in coniferous forests and streamsides in the Klamath Mountain Range between 1,600 - 6,600 feet elevation. It is ranked G3 S2.2.

Threats to this species include fire suppression and post-wildfire activities, including salvage logging and roadbuilding. Logging has been listed as a potential threat to this species although certain activities such as clearing the overstory and competing vegetation and its associated ground disturbance may stimulate the seed bank for this species (J. Nelson pers. comm. 2015). There are seven known occurrences on the Forest, however the closest occurrences to the project area are on the Six Rivers National Forest less than three miles west of the project area.

Canyon Creek stonecrop (*Sedum paradisum subsp. paradisum*) is a perennial herb that grows on granitic, rocky substrates in chaparral or subalpine, yellow pine, or mixed evergreen forest types between the Trinity Alps in the vicinity of Canyon Creek to the east side of the Klamath Mountains in northern Trinity and western Shasta counties. It has an elevational range of 985-6,250 ft. It is ranked G4G5T3 S3.

Possible threats include foot traffic, logging, and road construction. There are 31 documented occurrences of Canyon Creek stonecrop in California (CNDDDB) and 28 documented occurrences in NRIS on the Shasta-Trinity National Forest not including another ten which will be included in this taxon, pending the publication of current

genetic and morphometric study by Zika et al. (Nelson personal communication 2018). The closest known occurrence of this species to the project area is approximately 16 miles to the southeast.

Fringed grass-of-Parnassus (*Parnassia cirrata* var. *intermedia*) is a perennial herb ranked G5T2T3 S2. This taxon grows, in California, in wet areas along lake edges on rocky, serpentine soils below 9,600 feet elevation. The Great Basin occurrences are on alkaline substrates.

Possible threats include grazing, recreation, vehicles, and logging activities. There are eight populations on the Forest – five in Trinity County, and three in Siskiyou County. These occurrences are all within the boundaries of the Trinity Ultramafic Sheet. The closest known occurrence to the project area is approximately 15 miles to the east.

Klamath Mountain catchfly (*Silene salmonacea*) is a perennial herb ranked G1G2 S1S2.2 that blooms May-July. This species grows in openings in mid- to late-seral mixed conifer or mixed conifer-oak forests with patchy shrub understory; sometimes on ultramafic soils and/or on road cuts between 2500 and 3500 feet elevation.

Known threats include ground disturbance associated with thinning and fuels treatments and road maintenance. Natural Resource Information System (NRIS) shows nine occurrences and California Natural Diversity Database (CNDDDB) shows five occurrences of Klamath Mountain catchfly on the Forest, all of which exist in Trinity County and most of which are in Late Successional Reserves. The closest known occurrences to the project area are approximately 25 miles to the east.

Moonworts and rattlesnake fern (*Botrychium* subg. *Botrychium* and subg. *Osmundopteris*) are small, primitive vascular plants that are very uncommon throughout North America. They are ranked G3G4G5 S1S2. Moonworts' diminutive sizes have caused them to be overlooked in the field and assumed extremely rare. Moonworts grow in grassy openings that remain relatively moist throughout the growing season, most often on granitic soils. They frequently remain dormant for one or more years, which may contribute to their presumed rarity. Pumice moonwort is associated pumice fields, on pumice scree, and/or volcanic rubble and does not have suitable habitat in the project area. The most recent evaluation of this species identifies suitable habitat for pumice moonwort on the Klamath NF, and/or north and northeast of Mt. Shasta. Rattlesnake fern are larger in size but are also rarely found in California.

Known threats include grazing, recreational overuse, canopy removal and activities that modify soil hydrology. There is one known site of scalloped moonwort (*Botrychium crenulatum*) on the west side of the Shasta-Trinity national Forest, located in the Granite Creek watershed within the Trinity Alps Wilderness over 25 miles away from the project area. There are several other *Botrychium* species located on the east side of the Shasta-Trinity National Forest near Mt. Shasta.

Mountain lady's slipper (*Cypripedium montanum*) is another wide ranging but rare western North American orchid. It is ranked G4 S4 and is found in six western states. Like Brownie lady's slipper, in this drier part of California populations are very small and usually confined to relatively moist, shady habitats, especially older forests along riparian corridors. Habitat for Mountain lady's-slipper is very broad, occurring in Douglas-fir, white fir, and mixed conifer forests in the mid-late seral stages, as well as oak woodlands

and riparian areas. Habitat can be drier and more open than that of Brownie lady's slipper; however, most populations outside of riparian areas are generally confined to north or northeast aspects with filtered sunlight.

Exceptions to their general habitat description exist, which illustrates the difficulty in identifying key habitat characteristics. Micro-habitat variables appear to be important given the reproductive and establishment complexity of this species.

Known threats include logging and other vegetation reduction which would dramatically increase sunlight exposure, excessive grazing, high-severity wildfire and exclusion of wildfire. There are over 380 occurrences documented in California, 64 of which are on the SHF. The closest known occurrence to the project area is approximately three miles to the east.

Olive phaeocollybia (*Phaeocollybia olivacea*) is a gilled fungus that grows in scatters or arcs in mixed oak-pine forests (*Quercus-Pinus*, *Pseudotsuga/Abies/Tsuga-Lithocarpus*) coniferous forests or occasionally in pure coniferous stands. As with most fungi species little is known about its true distribution and abundance. The species is unusual-to-uncommon in California (the suspected center of distribution) and Oregon and rare in Washington.

The species is endemic to the Pacific Northwest from Washington to California. Its patchy distribution precludes estimation of population size and area of occupancy. The known populations are relatively stable, but the advent of "sudden oak death" (*Phytophthora ramorum*) imperils those in mixed forests due to the potential loss of its mycorrhizal host oak or tanoak tree species from this pathogen.

Known threats include activities which remove necessary host trees or those that cause ground disturbance, substantially altering microclimate and moisture regimes. There are 75 documented occurrences in California, 26 of which are on the Shasta-Trinity National Forest, mainly in Trinity County. The closest known occurrence to the project area is less than two miles to the north.

Oregon willow herb (*Epilobium oreganum*) is a perennial herb that occurs almost always under natural conditions in wetlands at 1,500 to 7,400 feet elevation. This species is also broadly endemic to serpentine soils. It is ranked G2 S2.2.

Known threats include grazing and grazing-related water development, watershed restoration projects, changes in hydrology, recreation (trampling and compaction of meadow wetlands) and road maintenance. There are 40 known occurrences in Northern CA, 18 of which are in Trinity County. The closest occurrence to the project area is over 21 miles to the east near Deer Creek Pass.

Pickering's ivesia (*Ivesia pickeringii*) is a perennial herb ranked G2 S2.2. This species typically grows in lower montane coniferous forests, seasonally wet meadows, swales, and rocky ephemeral stream beds on serpentine soils.

Known threats include timber harvest, grazing, roads and erosion. There are three known occurrences on the Forest – two of which are in Trinity County and the other in Siskiyou County. The closest known occurrence to the project area is approximately 30 miles to the east near the Horse Flat Campground.

Pink-margined monkeyflower (*Erythranthe trinitiensis*) is an annual herb ranked G3S3 that blooms June-July. This species grows in serpentine seeps, wet meadows, and roadsides within woodlands and coniferous forest between 4200 and 6500 feet elevation in Humboldt, Siskiyou, and Trinity counties.

No specific known threats have been identified yet for this species however since they are found roadside it may be that off-road vehicles could pose a danger to populations. The California Natural Diversity Database (CNDDB) shows 12 occurrences of this species in California, two of which are on the Forest. The closest known occurrences to the project area are approximately 14 miles to the south.

Red-pored bolete (*Boletus pulcherrimus*). Red-pored bolete is in the ectomycorrhizal (ECM) functional group. ECM fungi develop interdependent relationships with living host species whereby the fungus obtains carbohydrates from the host plant and the host plant obtains mineral nutrients and water from the fungus. The underground fungal tissue or mycelia is the network along which this transport of carbohydrates, mineral nutrients and water occur. The host for ECM fungi is commonly in the pine family (Pinaceae). Host specificity beyond this broad category is not known.

This species is known from the Pacific Northwest from British Columbia, Washington, Oregon, and south to northern California (Castellano et al 1999). In California approximately half of the records for this species are in coastally influenced forests (e.g. Redwood-Douglas-fir; Sitka Spruce) including the Klamath National Forest on the extreme western edge of the Marble Mountain Wilderness at 5200 feet (record dated 1979), Six Rivers (record dated 1972) in Douglas-fir-Tanoak Forest, and Shasta Trinity National Forest (2 records). The closest known occurrence to the project area is approximately 11 miles to the southwest.

Known threats include the extirpation of host species and alteration of substrate, e.g. ground disturbance that affects the integrity of the underground mycelial network, or removal of canopy and /or duff and litter layers that alters soil temperature and/or soil moisture regimes. Thus ground-disturbing activities that reduce the amount of rotting wood and interrupt the addition of fresh wood to rot could impact the species. Other threats include activities that alter the humidity, light patterns and composition of its habitat.

Scabrid alpine tarplant (*Anisocarpus scabridus* = *Raillardiopsis scabrida*) is a perennial herb which grows in upper montane coniferous forest on dry metamorphic, rocky soils. It is ranked G2G3 S2S3. The distribution ranges from Trinity and Shasta counties in the north through Tehama, Colusa, Mendocino counties, and into Lake County at the southern end of its range.

The primary threat to this species is from ridgetop fireline or fuel break construction. During the 1987 Mendenhall fire, tractor firelines were constructed down the ridgeline from Hull Mountain on the Mendocino N.F., which is the location of the second largest known occurrence of this species. Associated vehicular and trampling risks exist there as well as the potential for introduction of weed species. There are two populations on the Forest, both of which are in Shasta County. The closest population to the project area is approximately 30 miles to the east.

Shasta chaenactis (*Chaenactis suffrutescens*) is a perennial herb that favors sandy cobble along stabilized streams on serpentine soils. There is one population in the South Fork Management Unit on Bramlet Road that occurs on a serpentine road bank. It has been found only in California, in Trinity and Siskiyou Counties, and is ranked as G3 S3.2.

Known threats include: gravel mining, bridge and riverbed “repair” after flood events, dumping of waste material on flat terraces adjacent to rivers & roads, and anything that causes active erosion on rocky slopes. Invasive plants are also a threat, particularly dyer’s woad (*Isatis tinctoria*) that colonizes riparian habitats. Historic gold mining has destroyed suitable habitat. Shasta pincushion does not inhabit tailings piles. Sand and gravel operations along the Upper Trinity have had local and temporary effects; since these are right along the river, the species readily recolonizes from seeds dispersed by normal river flows; flood waters both remove temporarily stable river terraces and start new populations.

Other possible threats include recreation and grazing. There are 20 known populations on the Shasta-Trinity National Forest, 13 of which are in the Trinity River Management Unit, and one of which occurs within the project area and one is immediately adjacent to it, both in/near the Election Gap to Salmon Summit treatment area. The occurrences, though, are from 1935 and 1989, were aerially estimated, and no revisit has taken place, so exact condition and location of this occurrence is unknown.

Showy raillardella (*Raillardella pringlei*) is a perennial rhizomatous herb strictly limited to wet ultramafic (serpentine) soils along streams, in wet meadows, and in hillside seeps in upper montane mixed-conifer forest between 4,000 to 7,500 feet elevation. It is ranked G2 S2.2 and is known only in California.

Grazing is a known threat to this species. There are 33 documented populations of showy raillardella on the Forest, most of which are in Trinity County. The closest population to the project area is approximately 20 miles to the east near Mumford Meadow.

Tracy’s beardtongue (*Penstemon tracyi*) is a perennial herb ranked G1S1.3 that blooms July-August. This species grows on rocky outcrops between 6500 and 7250 feet elevation in the upper montane coniferous forests. The distribution for this species is restricted to a few high peaks in the Trinity Alps Wilderness (one site just outside the wilderness boundary) of northern Trinity County.

Known threats include trail realignment, collecting of plants visible from the trail, and climate change. There are eight known occurrences of Tracy’s beardtongue on the Forest, all of which exist in the Trinity Alps Wilderness. The closest known occurrence to the project area is approximately seven miles east near Limestone Ridge.

Trinity River jewelflower (*Streptanthus ob lanceolatus*) i– Trinity River jewelflower – STOB5

Range and Distribution: *Streptanthus ob lanceolatus* is endemic to steep metavolcanic bluffs along the gorge of the Trinity River above its confluence with New River. It has an elevational range of 70-1600 ft. There are two documented occurrences of *Streptanthus*

oblanceolatus in California (CNDDDB) and at the time of this writing these occurrences are not yet documented occurrences in NRIS.

Trinity River jewelflower grows in cismontane woodlands on steep metavolcanic bluffs, cliffs, and canyon walls, roadside mounds of rockslide scrapings. Its few associates include *Selaginella wallacei*, *Eriogonum nudum*, *Keckiella corymbosa*, *Sedum spathulatum*, *Pentagramma triangularis* subsp. *triangularis*, and *Polystichum imbricans* subsp. *imbricans*.

Trinity River jewelflower is a dicot in the mustard family (Brassicaceae). It is a perennial herb, endemic to Trinity County California, and blooms April-June. It is afforded some protection from disturbance by its preferential habitat on rock outcrops, but this potentially indicates that it is a disturbance avoider and might not regenerate well after human or natural disturbance.

Trinity River jewelflower is a CNPS List 1B.2 species that is rare, threatened, or endangered throughout its small range. It is possibly threatened by highway maintenance or widening; road maintenance; and invasive annual grasses (USDA Forest Service 2012). It is known from only two occurrences. Currently there are no known occurrences of this species within the analysis area however potential habitat may exist. The closest known occurrence to the project area is approximately eight miles to the south along highway 299.

Veined water lichen (*Peltigera gowardii*) is an aquatic lichen that anchors itself to rocks on cool mountain streams. It has a global ranking of G3G4; State rank S3, There are 26 element occurrences in the CNDDDB. The species is an indicator of water quality.

Known threats to this species include activities that increase stream flows or sedimentation to streams. This may scour gravel or rocks that the lichen is attached to, alter either the water chemistry or the stream channel morphology, or causes increases in water temperature via raising of the stream bed and/or alteration of shade-producing vegetation. There are no documented occurrences of this species on the Shasta-Trinity National Forest however some are adjacent to the Forest boundary. The closest known occurrence to the project area is approximately 40 miles northwest.

Whitebark pine (*Pinus albicaulis*) is a coniferous tree ranked G3G4. This species was designated in 2011 as a candidate for listing under the Endangered Species Act. Whitebark pine is one of the five-needled (i.e. 'white') pines and is also known as a 'stone' pine for its closed, wingless seed which is mainly dispersed by the Clark's nutcracker (*Nucifraga columbiana*). Whitebark pine often grows in relatively open, upper montane to subalpine forests and is found in Canada and the western United States.

Whitebark pine is present on the Shasta-Trinity National Forest primarily at elevations above 7,000 feet (Kauffmann et al. 2014). The exception for this elevational band is a young tree found in the Boulder Lake Basin below Mt. Hilton at 5,775 ft. - approximately 13 miles east of the project area. Although the elevations within the project area (1,500 to 6,700 feet) imply a low likelihood of presence of whitebark pine, the documentation of this previously mentioned 'lower-elevation' outlier suggests the possibility of occurrence. There are no mapped populations of whitebark pine within the project area. The nearest mapped population to the project area is approximately 12 miles to the east near the Canyon Creeks area of the Trinity Alps Wilderness.

Known threats to this species across its range include, but are not limited to, a combination of environmental effects resulting from climate change, mortality from white pine blister rust (WPBR), periodic mountain pine beetle (MPB) outbreaks, catastrophic fire and fire suppression, and fire exclusion (Keane et al. 2012).

Wilkins' harebell (*Campanula wilkinsiana*) is a perennial rhizomatous herb ranked as G2 S2.2 and it is restricted to Mt. Shasta, Trinity Alps and Marble Mountains in California. Wilkins' harebell grows in wet meadows, seeps, or along rivers within subalpine/upper montane coniferous forest from between 5,700 to 8,600 feet elevation.

Known threats include grazing, recreational activities (e.g. trampling by hikers), and trail construction. There are 22 known occurrences on the Forest, five of which exist in Trinity County. The closest known occurrence to the project area is approximately 11 miles southeast near Thompson Peak.

Desired Condition

Desired future conditions for the land allocation in which treatments would occur – MA 4 (Wilderness Management Areas) – are described in the Shasta-Trinity NF Land and Resource Management Plan (LRMP or Forest Plan) and in Forest Service Manual (FSM) 2300, Chapter 2320 – Wilderness Management. In summary, these desired future conditions are as follows:

1. The risks and consequences of wildfire occurring within wilderness or escaping from wilderness are at an acceptable level (FSM 2324.21).
2. The fuels condition allows for reduced fire behavior characteristics and enables wildfire suppression tactics to make use of natural barriers, topography or watercourses and minimum impact suppression techniques.
3. Lightning-caused fires play, as nearly as possible, their natural ecological role within wilderness (FSM 2324.21) (LRMP page 4-93), with an appropriate suppression response ranging from confinement to control (LRMP page 4-17) to protect public safety.
4. The risks and consequences of public health and safety concerns caused by hazardous air conditions are reduced.

Environmental Consequences

Alternative 1 - No Action

Direct and Indirect Effects

Under the no action alternative, management activities would not change. Wildfire suppression would continue, as directed by the Forest Plan. Late-successional coniferous forest habitat would continue to develop in quality and abundance, and increase in quality for late-seral Sensitive species. Early-seral conifer habitat would continue to develop

into mid and late-seral habitat at current rates. Early-seral conifer areas would reduce in species diversity as tree canopies close and shade-intolerant species drop out.

The Trinity Alps Prescribed Fire project area is identified as being within a high wildfire risk area based on factors such as lightning starts, presence of human activity, and presence of a hazardous fuels condition (see project Fire, Fuels, Air Quality and Vegetation report). The project area has experienced portions of several large (>1000 acres) fires over a 78-year period (1938 to 2015). Approximately 60 fire starts have occurred within the project area over a 30 year range (1979 to 2009). Over 6,000 acres within the overall project area burned in the River Complex fire of 2015, 17% of which was high severity. If no treatments occur the current stand densities that have higher fuel loadings and higher fire hazard would still remain. Not implementing an action alternative could increase the possibility of the project area experiencing high-severity wildfire, which could result in adverse impacts to several Sensitive botanical species in the project area.

Habitat for 22 Sensitive botanical species occurs in the project area. These species (and their associated ecological communities) have evolved in a fire-dependent ecosystem¹⁷ therefore they may be expected to survive or respond positively to low or moderate-intensity wildfire. Fire suppression activities and wind events have over the last century may have been driving high-intensity wildfires in most coniferous forests in the Klamath Mountains of California thus several native plant species are not resilient to that level of disturbance. Research in the last several years has indicated that fire size and frequency are on the rise in western U.S. forests. Although fire size and frequency are important, they do not necessarily scale with ecosystem effects of fire, as different ecosystems have different ecological and evolutionary relationships with fire. Trends and patterns such as severity, size, and number of fires in northwestern California during 1910–2008 were studied which showed the mean and maximum fire size and total annual area burned increased, but they authors found no temporal trend in the percentage of high-severity fire during 1987–2008 (Miller et al. 2012). Burning of aboveground reproductive structures or lethal soil temperatures that can kill underground reproductive structures (e.g. the shallow rhizomes of Brownie and mountain lady's slipper) may directly cause adverse impacts to some plant species. The downing of trees or snags during a wildfire event from suppression activities could also cause direct adverse impacts to plant species within the fall-zone of these objects.

Indirectly, severe modifications in the forest canopy from crown fire could be large enough to eliminate or reduce necessary habitat characteristics, such as shade, critical for native and rare species' survival. In particular, species such as Mountain and Brownie lady's-slipper, bug-on-a-stick, red-pored bolete, branched collybia, and olive phaeocollybia, which occur in mature and late seral mixed conifer forested areas, could be adversely impacted by a loss of suitable habitat from a high-intensity wildfire event.

Riparian or wet-meadow species such as moonworts, fringed grass-of-Parnassus, Oregon willow herb, Wilkins' harebell, or California globe mallow may also be affected by a loss of suitable habitat in the event of a high-intensity wildfire, which could shift the vegetation community succession such as a stand replacing fire. However, since these species typically grow in very moist environments where fire is less able to proliferate

¹⁷ Skinner 2003

during normal climatic conditions, impacts from these fire events may be more moderate. Similarly, species growing in more open habitats (e.g. scabrid alpine tarplant, blushing wild buckwheat, Trinity River Jewelflower and Canyon Creek stonecrop), such as rocky outcrops, may experience only minor to moderate impacts to suitable habitat due to the limited presence of other vegetation needed to carry fire. In a high intensity wildfire event, however, these species which tend to grow in openings within coniferous forests would experience negative impacts since they cannot necessarily tolerate a complete loss of overstory canopy.

Cumulative Effects

The western half of the Trinity Alps has seen more fire since 1987 than any other part of the Trinity Alps Wilderness and perhaps the entire Klamath Mountain Bioregion. In particular, the Megram fire (1999), the Bar Complex fire (2006), the Iron Alps fire (2008), the Backbone fire (2009), and the River Complex (2015) have had varying effects on the vegetation in the project area. As noted previously, approximately 23 percent of the project area is non-stocked due to past fire events. Non-stocked areas correspond to moderate–high vegetation severity codes (in RAVG). Additionally, past fire events and fire suppression activity within the project area has resulted in an accumulation of ground and ladder fuels that may burn, or re-burn, in the event of an unplanned fire.

The combined current conditions of a high number of lightning starts, some recreational visitors in the area (which increases the likelihood of unplanned ignitions), and the presence of hazardous fuels all lead to an increased risk of high-severity effects from unplanned wildfires occurring within the project area.

A high-severity wildfire event would still likely have major adverse effects for Sensitive botanical species; especially those requiring moist, shady environments (e.g. moonworts, Wilkins' harebell, Brownie lady's slipper, Oregon willow herb, California globe mallow, Pickering's ivesia, fringed grass-of-Parnassus, showy Raillardella and bug-on-a-stick).

The existing condition modeling shows approximately 42 percent of the project area has the potential for high or moderate-severity effects to vegetation in the event of an unplanned wildfire (see project Fire, Fuels, Air Quality and Vegetation report). Additionally, ongoing wildfire suppression methods (as directed by the Forest Plan) could require the creation of fuel breaks which could adversely impact those Sensitive species, or their habitat, which reside in the same spatial location of the suppression activities. A high-severity wildfire event could also create favorable conditions (e.g. open canopy, decreased number of native species for resource competition) for noxious weed invasion. A noxious weed invasion would have the potential to displace native species and the broader native plant communities including sensitive botanical populations.

Conclusion: The cumulative effects of previous fire suppression management, associated high fuel loads, and increased fire ignitions from ongoing recreational activities (e.g. hiking, hunting, stock use) in the project area would increase the risk of stand-replacing fire. The result would be a short-term moderate adverse direct effect of the burning of reproductive structures of plants, and a long-term moderate, adverse indirect effect of the removal of suitable habitat (e.g. removal of overstory canopy, accumulation of downed fuels) for all previously mentioned Sensitive botanical species. The distribution and abundance of these species would result in a negligible change from the current distribution and abundance.

Effects Common to Both Action Alternatives

As noted previously, the predicted effects from the implementation of prescriptive burns are quantified by using fireline intensity potential and crown fire potential as methods to discuss vegetation severity and, therefore, potential effects to botanical species. The following tables display expected outcomes from the application of prescribed burns within the treatment areas for Alternatives 2 and 3. See the project Fire, Fuels, Air Quality and Vegetation report for specific information on how these values were derived¹⁸.

Table 5. Projected fireline intensity from prescribed burning.

Fireline Intensity	Alternative 2 Treatment Acres	Percent of Area Alternative 2	Alternative 3 Treatment Acres	Percent of Area Alternative 3
Non-flammable areas	128	1%	128	1%
Low (1-1200 BTU)	15,945	96%	18,180	96%
Moderate (1201-2200 BTU)	374	2%	469	2%
High (2201+ BTU)	191	1%	242	1%
Totals	16,638	100%	19,019	100%

Table 6. Projected crown fire potential from prescribed burning.

Type of Fire	Alternative 2 Treatment Acres	Percent of Area Alternative 2	Alternative 3 Treatment Acres	Percent of Area Alternative 3
Unburned	0	0%	0	0%
Surface fire	9,702	58%	11,059	57%
Passive crown	7,005	41%	8,024	42%
Active crown	2	<1%	5	<1%
Totals	16,709	100%	19,080	100%

Impacts to Sensitive Vascular Plants, Bryophytes, and Lichens

Direct Effects

General Discussion

Prescribed burning is estimated to result in primarily low severity impacts to species due to the low fireline intensities and lack of crown fire expected from implementation (see Tables 5 and 6). It should be noted, however, that it is possible for a low intensity surface fire to consume the forest floor and damage sprouting tissues¹⁹; therefore, all discussions

¹⁸ Re-projections of data in ArcGIS and ArcFuels can lead to geometric discrepancies (i.e. differences in acreage) of less than one percent. All resultant acres are approximate. See project file for further information

¹⁹ Brown and Smith 2000

involving intensity are not a strict one-to-one relationship. Ninety-six percent of the acres within the treatment areas are projected for low-intensity fire and 58 percent are modeled for surface fire. Moderate fireline intensity may result in a moderate level of mortality; however, since only two percent of the treatment areas are projected to result in this level of intensity, effects to plant, lichen, and fungi species would be minor to moderate. Portions of high fireline intensity would directly affect species through potential direct mortality (i.e. burning) of those species either above-ground or below-ground through high soil temperatures. Because only one percent of the areas within the treatment areas are projected for high fireline intensity, direct effects from this would also be minor.

Direct damage from prescribed fire to aboveground reproductive plant components (e.g. flowers) would also be limited due to limitations on season of burn. Limited operating periods for northern spotted owls necessitate that prescribed fire may only take place between September 16 through January 31 in relevant areas (see project wildlife report). These dates are well outside of typical reproductive season for flowering plants.

Serpentine-associated Plant Species

There are approximately 1,177 and 1,289 acres of serpentine or ultramafic soils within Alternative 2 and 3 treatment areas respectively. Species such as Shasta chaenactis, pink-margined monkeyflower, Oregon willow herb, , Pickering's ivesia, fringed grass-of-Parnassus, and showy raillardella are either strictly or broadly endemic to this soil type and typically occur either within montane coniferous forest (upper or lower) or within wet meadows, bogs, or seeps.

Of the serpentine acres present, approximately 912 -1,016 acres are occupied by vegetation types that may also be suitable for these species (e.g. Pacific Douglas-fir, Douglas-fir – White fir, Douglas-fir – ponderosa pine, mixed fir, red fir, subalpine conifer, or white fir). Of that area, approximately 3-4 percent is projected to have moderate to high fireline intensity through the prescribed burn. The remaining 95-96 percent is typed as low intensity fire only. These potential direct adverse effects to serpentine-associated species would be minor and short term due to the small percentage of affected area.

Rocky Outcrop-associated Plant Species

Species such as scabrid alpine tarplant, blushing wild buckwheat, Canyon Creek stonecrop, Trinity River Jewelflower and Shasta chaenactis may grow in this habitat type. Species such as scabrid alpine tarplant, Penstemon tracyi, and Canyon Creek stonecrop are generally found on rocky outcrops in coniferous forest openings therefore this overstory was used to assess potential habitat acres.

There are approximately 10,624 - 12,184 acres of rocky outcrop with coniferous forest overstory vegetation types within the treatment areas under Alternatives 2 and 3, respectively. In both alternatives, approximately 99 percent of the habitat is modeled for low fireline intensity. The remaining one percent is moderate to high. Shasta chaenactis is a strict serpentine endemic and is assessed above. Blushing wild buckwheat is found along open ridgelines with little surrounding overstory vegetation.²⁰

²⁰ Reveal and Knorr 2004

Direct adverse effects to species in this guild would be negligible to minor and short term due to (1) the small percentage of moderate/high intensity output, (2) the presence of other vegetation necessary to carry fire (within the immediate surroundings of the Sensitive plants) would likely be limited in abundance or absent.

Late-successional Forest-associated Plant Species

Species such as Brownie and mountain lady's slipper, Bay horsehair lichen, bug-on-a-stick, and Klamath Mountain Catchfly would be likely to occur in this habitat – although they are not strictly limited to it (e.g. Brownie and Mountain lady's slipper). There are approximately 4,944 and 5,620 acres of late-successional habitat within Alternative 2 and 3 treatment areas respectively. Of the suitable acres within the treatment areas for both alternatives, less than one percent of the area is modeled for moderate to high fireline intensity. Ninety-nine percent of the area is modeled to result in low fireline intensity. Potential adverse direct effects to late-successional-associated species would be minor due to the small percentage of moderate/high intensity output for this habitat.

Riparian or Wet-Meadow-associated Plant Species

Species such as moonworts, Brownie lady's slipper, fringed grass-of-Parnassus, showy raillardella, bug-on-a-stick, Oregon willow herb, Wilkins' harebell, Goward's water fan, or California globe-mallow may occur in this habitat type. A total of 45 acres within treatment areas (19 acres Alternative 2, 45 acres Alternative 3) that are have suitable habitat in riparian vegetation type (e.g. Riparian Mixed Shrub, Riparian Mixed Hardwood, Willow, Willow-Alder, or Wet Meadow). Less than one acre of riparian habitat is modeled for high fireline intensity (in both alternatives) and only two acres are modeled for moderate fireline intensity (in Alternative 3 areas only).

Some of these species (e.g. moonworts, Wilkins' harebell, Oregon willow herb, fringed grass-of-Parnassus and showy raillardella) are more likely to occur in the wet meadow type; 13 acres of which occur in the project area and only two acres occur within a treatment area (Salmon Summit to Election Gap). None of those acres are modeled for moderate or high intensity burn. All of the acres fall within the zone of the Megram fire (1999) and all of them are labeled as 'unchanged'. This implies that these areas may be too wet to carry fire in a normal precipitation year. These areas are particularly good habitat for Wilkin's harebell due to the presence of red fir and subalpine conifer vegetation types nearby. Other species, such as Pickering's ivesia (which grows in more mesic, clay seeps, which potentially in coniferous forest or areas typed as shrub), Brownie lady's slipper, and bug-on-a-stick may occur in mesic areas that are not wet meadows – see late successional discussion.

Goward's water fan anchors itself to rocks on cool mountain perennial streams. Prescribed fire would not move into a strictly aquatic environment therefore there would be no direct effects to this particular species. The other riparian-associated species not found directly in streams could be flowering during the application of prescribed fire and have low reproductive success from damage to above ground parts. These species are also very unlikely to experience high-severity fire due to the mesic habitat in which they grow. The potential direct adverse effects to these species would be minor and short-term due to the aforementioned factors.

Indirect Effects

General Discussion

A large portion of the acres within proposed treatment areas (approximately 42 percent) are projected to result in passive crown fires and less than one percent would result in an active crown fire or high fireline intensity. As noted previously, the removal of overstory canopy from an active crown fire would have an adverse indirect effect to some Sensitive plant species due to increased exposure to sun, loss of soil moisture due to the removal of duff, etc. This adverse effect, however, would be minor due to <1 percent of area projected for active crown fire. The areas projected for passive crown fire could reduce the overstory canopy within individual trees or small groups of trees (see the project Fire, Fuels, Air Quality and Vegetation report). Although passive crown fire would not result in a high amount of canopy removal, the adverse effects would be moderate due to the large amount of area (42 percent of treatment areas' acreage) projected for this outcome.

Indirect beneficial effects of passive crown fire, surface fire, and/or areas with low fireline intensity would include the eventual development of late-successional characteristics from the opening-up of the canopy and the mimicking of natural disturbance cycles. The effects of reintroducing fire could help manage older forest conditions ranging from 75-150 years of age and where single layered canopy conditions predominate towards old growth stands. The indirect effects of treating fuels under a prescribed burn scenario would also result in lower vegetation severities during possible future wildland fire events.

Serpentine-associated Plant Species

Of the serpentine acres present with suitable vegetation types (see previously discussed direct effects section) there are no acres projected for active crown fire. A total of 826 acres under Alternative 2 and 891 acres under Alternative 3 would be either unburned or have a surface fire effect from implementation of prescribed burns. The remaining 351 or 398 acres (Alternatives 2 and 3 respectively) are estimated to burn as a passive crown fire. This treatment, then, could result in somewhat reduced available soil moisture from reductions in canopy closure, which may have moderately adverse indirect effects for species such as the *Cypripedium* spp. or Pickering's ivesia. Serpentine-associated species which typically grow in more open, rocky outcrop settings (e.g. Shasta chaenactis) would be less affected due to the already limited presence of overstory vegetation. Serpentine-associated species which typically grow in more mesic areas (e.g. Oregon willow herb, fringed grass-of-Parnassus, and showy raillardella) would experience minor to moderate indirect effects due to a reduced overstory canopy. See Riparian-associated plant discussion below.

Rocky Outcrop-associated Plant Species

Approximately 58 percent of the potential suitable habitat for these species is modeled for surface fire within both treatment areas. The remaining 42 percent is modeled as passive crown fire. Active crown fire accounts for less than one percent of the affected area. A passive crown fire would primarily have a moderate, long-term beneficial indirect effect due to the opening of the canopy around these species.

Late-successional Forest-associated Plant Species

Late-successional habitat is modeled to result in approximately 57-58 percent surface fire and 41-43 percent passive crown fire. No active crown fire is modeled for this habitat type. There would be a minor adverse effect on a microsite basis from passive crown fire where overstory canopy is removed, reducing shade or soil moisture needed for these species. Implementation of the action alternatives would result in a moderate indirect beneficial effect to late-successional species due to a reduction in competing understory vegetation. Also for canopy species such as Bay horse hair lichen prescribed fires are beneficial to their habitats because of the reduced possibility of stand-replacing fire (T. Carlberg person. comm., 2014).

Riparian or Wet-Meadow-associated Plant Species

Less than one acre (in either alternative) of this habitat type is modeled for passive crown fire. All other acres in this type are modeled for surface fire only. In the event of a wildland fire sedimentation of streams and/or a scouring of rocks (to which species such as the veined water lichen may attach) could occur, thus diminishing the quality of habitat for riparian species. Treatment of the fuels, then, would indirectly benefit these species since there would be a reduced likelihood of high vegetation severity and a loss of the vegetation that stabilizes soils, in the event of wildland fire.

Additionally, implementation of the action alternatives would result in a moderate indirect beneficial effect to riparian species such as, Brownie lady's slipper, or Pickering's ivesia, due to a reduction in competing understory vegetation.

Cumulative Effects

Past and Current Actions

Existing habitat conditions can reflect the results of the past actions and contribute to the cumulative impacts to botanical species of concern. All 58,349 acres of the project boundary are part of the Trinity Alps Wilderness area ever since 1984, with an emphasis on 'Pristine' wilderness opportunity class and/or Visual Quality Objectives (VQOs) of 'Preservation' (see the project Recreation and Scenery report and the forest plan²¹). These designations have minimized the amount of past ground disturbing activities in the project area. For example, no timber harvest is documented as occurring within the project area over the past 100 years.

Future Actions

There will continue to be ongoing trail maintenance by the Forest Service and California Conservation Corps (CCC) personnel. Maintaining the trail system prevents rutting and erosion that could cause damage to lands adjacent to the trail system. The CCC has maintained the trail system in the Trinity Alp wilderness for almost 30 consecutive years. There are no other known future actions in the project area.

General Discussion

²¹ USDA Forest Service 1995

As noted previously there have been several fires within the project area within the past 100 years resulting in the vegetative conditions we see today. In particular, approximately 40 percent of the acreage within the project area that burned during the Megram fire of 1999 resulted in moderate to high vegetation severity. In 2009 approximately 4,898 acres within the project area burned during the Backbone fire – 1,785 of which burned at high severity. Of those acres, approximately 1,208 acres (68 percent) were areas from the Megram fire that re-burned – resulting in further high vegetation severity. Thus, the Backbone fire burned at higher severities in areas that were already severely burned during the Megram Fire. Additionally, the Iron Alps complex fire of 2008 covered approximately 3,708 acres within the project area and resulted in 25 percent of the affected acres burning with moderate to high severity. More recently, the 2015 River Complex had over 6,000 acres overlapping the project area – 1,070 of which burned at high severity. The combination of these past fires, along with fire suppression efforts during past fires, have potentially decreased coniferous habitat in the project area for some dependent Sensitive botanical species that will not persist after a stand replacing fire.

Application of prescribed fire during the seasonal burning restrictions (in either action alternative) is anticipated to result in vegetation effects for the majority of the treatment areas that are categorized in the severity classes of ‘unchanged’, ‘low’, and occasionally ‘moderate’ (see the project Fire, Fuels, Air Quality and Vegetation report).

Serpentine-associated Plant Species

No areas within the serpentine acres are typed as wet meadows or bogs, so it is highly unlikely species such as Oregon willow herb, grass-of-Parnassus or showy raillardella would be present within proposed treatment areas. There are, however, approximately 10 acres in the northwestern portion of the project area – in the Salmon Summit to Fawn Ridge treatment area – that is typed as Riparian mixed shrub where portions of 1st and 2nd order streams occur, so this area may have more likelihood for presence of the aforementioned species. Of the 3,979 acres of possible serpentine substrate within the entire project area, approximately 12 percent of this type is currently non-stocked (i.e. experienced high vegetation severity from past events or otherwise naturally bare). This loss of potential habitat, combined with minor potential indirect effects from passive crown fire, as well as minor potential direct effects from moderate/high fireline intensity lead to a possibility of moderate adverse cumulative effects to serpentine-associated species.

Rocky Outcrop-associated Plant Species

Of the 38,006 acres of possible coniferous habitat in the project area that may have openings for species associated with this habitat guild, 33 % is currently labeled as non-stocked from past fire events. The term ‘openings’ implies an area with possible indirect shading and thus it cannot be assumed that a complete removal of overstory vegetation would benefit these species. Some species, however, such as blushing wild buckwheat, which grows on rocky open, ridgelines was likely not majorly adversely affected by past fire events (unless directly burned or impacted by downed fuels). As noted previously, 58 percent of this habitat type is modeled for surface fire, 42 percent is modeled as passive crown fire and 99 percent is modeled for low fireline intensity. The expected direct and indirect effects, combined with past and future actions would result in a minor adverse effect to these species.

Late-successional Forest-associated Plant Species

Approximately 18,868 acres of late-successional coniferous forest occurs in the project area.

It is difficult to assess vegetation severity measures resulting from past fires due to a lack of information regarding previous cover/density and tree sizes. If approximately 23 percent of the project area is labeled as non-stocked, we can infer that an additional 5,660 acres of late-successional habitat may have occurred previous to recent fires. A 41-43 percent measure for predicted passive crown fire, and a less than one percent measure for predicted moderate to high fireline intensity (within this habitat type), combined with presumed past loss of habitat, result in a minor adverse effect to these species. The removal of excess fuels, however, and the prevention of major adverse effects from future wildfire events, would result in a moderate beneficial effect to these species.

Riparian or Wet-Meadow-associated Plant Species

There are approximately 115 acres of perennial riparian-related vegetation types modeled within the entire project area. A total of 61 of these acres (53 percent) are modeled as non-stocked from previous fires. Less than one acre (in either alternative) is modeled for passive crown fire or high fireline intensity, and two acres are modeled for moderate fireline intensity. Although the effects to this habitat were major from past fire events, the two action alternatives would, in combination, only minimally increase the potential for adverse effects to these species.

Conclusion: Based on the lack of field surveys and the presence of suitable habitat, it is my determination that either action alternative may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for all Sensitive vascular plants, bryophytes, and lichens species considered in this analysis.

Impacts to Sensitive Fungi Species

Suitable habitat for Sensitive fungi species is present and no field surveys were conducted, therefore it is assumed individuals of branched collybia, olive phaeocollybia, and orange-peeled fungus may be present within the project area – primarily in late-successional coniferous forest habitat. Potential impacts to these species will be addressed collectively.

Little or no scientific research has been completed on impacts from management activities to the three Sensitive fungi, but impacts are thought to be similar to those for common forest fungi. Results of research studies on impacts to these species are available to varying degree and those will be cited where applicable.

Habitat requirements for fungi at their most basic level include organic matter from which nutrients and water are extracted and a host tree for exchange of nutrients.²² Water or moisture is almost always necessary to speed decomposition and to sustain plant biomass that would ultimately provide organic matter. Highest quality habitat generally includes abundant organic matter in the form of litter, duff, and down logs, associated host trees, and shade to provide cool, moist conditions that would facilitate decomposition of organic matter. Disruption of the belowground fungal network from host tree or duff layer removal would disrupt nutrient exchange, and moisture is essential

²² Castellano et al.1999

to fungal organisms for survival. Underground fungal networks may go into dormancy when moisture is lacking, but expansion of the mycelium is unlikely to occur and the population would eventually die if dry conditions were sustained over long periods.

Specific habitat requirements for the three species are as follows:²³

- Olive phaeocollybia requires an oak or mixed oak-pine host trees for survival (but may occasionally be found in pure coniferous stands).
- Branched collybia (mycoparasite) requires the presence of another fungus species, this is provided in organic debris.
- Red-pored bolete requires late-seral Douglas fir or pine forests with a component of hardwoods as hosts.

Direct Effects

Disruption of mycelia networks are unlikely to occur due to a lack of ground-disturbance (i.e. upturning of soil) within the proposed treatment areas. Fungi typically fruit only when soil is cool and/or wet. Soil protection and Best Management Practices prohibit treatment activities while soil exceeds maximum moisture levels to prevent compaction. Fungi would likely be present above ground during periods where treatments could occur from September 16th to February 1st increasing potential impacts to fungal fruiting bodies. Although, in areas of high severity burns, the below soil layers would be altered and could impact below ground mycorrhizal networks.

High soil temperatures are restricted to the top 5 centimeters (2 inches) of soil, while fungal and plant root biomass can reach lower depths.^{24 25} As noted previously in the late-successional habitat discussion, a less than one percent of suitable habitat acres within these treatment areas are modeled for high fireline intensity and approximately one percent is modeled for moderate fireline intensity from prescribed burn. Potential direct effects to fungi species would be minor due to the small percentage of affected area. Recovery and reintroduction of any populations of branched collybia, olive phaeocollybia, or red-pored bolete is expected from residual fungal biomass in the areas surrounding high-severity pockets. Direct effects to fungi species would be minor and short-term.

Indirect Effects

Indirect impacts can be longer lasting to fungi than direct impacts. Removal of mature overstory trees would disrupt host tree connections for olive phaeocollybia and red-pored bolete. Areas within treatment areas projected to result in high-severity patches (greater than 75 percent basal area loss) and/or active crown fires (see project Fire, Fuels, Air Quality and Vegetation report) would result in increased sunlight to the forest floor would dry out the soil and organic layer more quickly, reducing available moisture necessary for fungi growth and reproduction and slowing organic matter decomposition rates..

As noted before, late-successional habitat is modeled to result in approximately 57-58 percent surface fire and 41-43 percent passive crown fire. No active crown fire is

²³ Castellano et al.2003

²⁴ Visser 1995

²⁵ Smith et al. 2004

modeled for this habitat type. Thus, potential effects to fungi species' and their potential suitable habitat would be minor and short-term.

Cumulative Effects

Habitat characteristics for the three species include mature to late-seral forest, true fir or Douglas-fir host trees, an overstory canopy of at least 50 percent to provide shade for moisture retention and timely organic matter decomposition, and a diversity of understory vegetation to provide underground fungal diversity.^{26 27} As noted previously, there are approximately 18,868 acres of potential suitable habitat for late-successional species within the project area and approximately 4,944 and 5,620 acres of potential suitable habitat within treatment areas for Alternatives 2 and 3 respectively.

It is difficult to determine the most important factor that influences healthy fungi populations. Influences include a diverse underground fungal community for purposes of regeneration and recovery from environmental impacts, aboveground species diversity to provide multiple host species and organic matter inputs, and adequate soil moisture for fungi growth and regeneration as well as terrestrial species growth and organic matter contribution.

Refer to Table 1 for a summary of relevant past and future activities in the cumulative impacts analysis area that have resulted in reductions in habitat for branched collybia, olive phaeocollybia, and red-pored bolete.

Past actions have contributed to modification or loss of a possible 5,660 acres of the suitable habitat within the project area. Either action alternative would contribute to negative impacts to an additional 30 acres of available habitat. In relation to the total amount of past and present suitable habitat for Sensitive fungi, the action alternatives would contribute less than one percent of additional impacts to habitat for branched collybia, olive phaeocollybia, and red-pored bolete. This incremental increase is not sufficient to threaten the viability of the three species or lead any of the species to a trend toward federal listing.

Conclusion: Based on the lack of field surveys and the presence of suitable habitat, it is my determination that alternative 2 may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for olive phaeocollybia, branched collybia, or red-pored bolete.

Alternative 3 - Additional Treatment Areas

The majority of effects are shared between Alternatives 2 and 3. The addition of three treatment areas (2,379 acres) under Alternative 3 would increase the acreage for both the beneficial and the adverse effects to botanical species. The likelihood of short-term and minor adverse effects such as the previously discussed direct and indirect impacts to Sensitive botanical species would be marginally increased for these treatment areas.

The addition of these treatment areas in the Virgin Creek drainage, however, would have the beneficial effect of enhancing the effectiveness of these proposed prescribed burns

²⁶ Castellano et al. 1999

²⁷ Castellano et al. 2003

which would improve the likelihood that rare plants or their habitat would not be adversely affected by high-severity wildfire.

Conclusion: Based on the lack of field surveys and the presence of suitable habitat, it is my determination that alternative 3 may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for all Sensitive vascular plants, bryophytes, lichens, and fungi species considered in this analysis..

Alternatives Comparison Summary

The following table shows Resource analysis indicators and measures comparisons across all alternatives.

Table 7. Resource analysis indicators and measures by alternative

Analysis Indicator	Measure	Alternative 1	Alternative 2	Alternative 3
Effects of the alternatives on rare plant populations and suitable habitat	Predicted amount of fire line intensity and crown fire potential (as a measurement for vegetation fire severity) in Forest Sensitive botanical populations or suitable habitat.	No direct, indirect, or cumulative effects due to no action. Increased potential for severe wildfire effects which could destroy habitat for sensitive species resulting in population viability decline.	Effects from this alternative would result in minor beneficial and adverse effects for all botanical species analyzed. Strongly decreased potential for severe wildfire effects to species post-treatment.	Effects from this alternative would result in minor beneficial and adverse effects for all botanical species analyzed. Strongly decreased potential for severe wildfire effects to species post-treatment.

As noted in the table above, potential adverse impacts from fireline intensity and crown fire potential would be highest under alternative 1 (more than 50% of the project area predicted for high severity effects), much less so under alternative 2 (10% predicted for high severity effects), and the same lesser amount (10%) under alternative 3. Due to the application of design features protecting rare plant habitat in the treatment units, though, and due to the long-term beneficial effects of reducing the potential for severe impacts from wildfire activities, there would be little appreciable difference between the action alternatives in regards to effects to rare botanical species.

Determination

Based on the above analysis of the Trinity Alps Wilderness Prescribed Fire Project (Alternatives 2 and 3), using the most current available scientific information, it is my determination that:

1. Implementation of the project may affect individuals, but is not likely to result in a trend towards Federal listing or loss of viability of the 22 vascular plant, lichen,

bryophyte, and fungus species analyzed in this report. This determination is based on the following:

- a) A very low percent of the proposed treatment areas (approximately one percent) is modeled for high-intensity fire or active crown fire from treatments. Therefore, it is likely that only a negligible amount of suitable habitat for Sensitive botanical species would be potentially adversely affected.
- b) Long-term moderate direct and indirect beneficial effects are expected from the treatments as long-term population viability is enhanced, and plants and habitat are protected from uncharacteristically extreme wildfire behavior.
- c) With the expected trend toward a historic fire regime, the forest would become more fire-resilient and fire could resume more of a natural role in the ecosystem.
- d) Burning restrictions will help protect vascular plant species reproduction cycles or fecundity, which typically occurs during the no burn restriction from February 15 through September 15.

Compliance with the Forest Plan and Other Regulatory Direction

With incorporation of the proposed design features, implementation of either action alternative would be consistent with direction provided in the forest plan, FSMs, and other applicable policies, laws, and direction (see Regulatory Framework section of this report) for preservation of botanical resources within the project area.

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Appendix A – Sensitive Botanical Species

Sensitive Plant, Lichen, and Fungi Species Known or Suspected to Occur on the West Side of the Shasta-Trinity National Forest and Probability of Occurrence within the Project Area. Species eliminated from further consideration in this project BE are indicated and explained in the table below.

Species	Habitat & Rationale for Eliminating From Consideration	Potential for Presence in Project Area
Vascular Plants		
<i>Anisocarpus scabridus</i> Scabrid alpine tarplant G2G3 S2S3	Rocky, open subalpine slopes. 5500-7500 feet elev. North Coast Ranges & southern Cascades.	Y
<i>Botrychium</i> subg. <i>Botrychium</i> and subg. <i>Osmundopteris</i> Moonwort, rattlesnake fern G3/G4/G5 S1/S2	Riparian edges in mid to high elevation forest. Fields, shrubby slopes, shady forests; riparian areas; 1000-6000 feet elev.	Y
<i>Campanula wilkinsiana</i> Wilkins' harebell G2 S2.2	Streambanks & springs in red fir and subalpine forests; 5500-8600 feet elev.	Y
<i>Chaenactis suffrutescens</i> Shasta chaenactis G3 S3.2	Rocky open slopes, cobbly river terraces; on ultramafic soils or glacial till w/ ultramaphics included. 2600-6900 feet elev. Eastern Klamath Ranges of CA.	Y
<i>Clarkia borealis</i> ssp. <i>borealis</i> Northern clarkia G3T2 S2.3	Foothill woodlands and forest margins. 1300-2600 feet elev. Eastern Trinity and W. Shasta Co. Out of geographic range.	N
<i>Cypripedium fasciculatum</i> Brownie lady's slipper G4 S3.2	Mixed conifer or oak forests on a variety of soil types, often but not always associated with streams; 1300-6000 feet elev. Widespread but sporadic.	Y
<i>Cypripedium montanum</i> Mountain lady's slipper G4 S4	Mixed conifer or oak forests on a variety of soil types, often but not always associated with streams; 1300-6000 feet elev. Widespread but sporadic.	Y
<i>Draba carnosula</i> Mt. Eddy draba G2 S2.2	High elevation ridges and summits on rocky serpentine soils; 6000 to 9000 feet elev. Serpentine in area too low in elevation.	N
<i>Epilobium oreganum</i>	Wet, gently sloping stream banks,	Y

Species	Habitat & Rationale for Eliminating From Consideration	Potential for Presence in Project Area
Oregon willow herb G2 S2.2	meadows, & bogs, generally on ultramafic soil. 500-7800 feet elev. Klamath Ranges of CA & OR.	
<i>Eriastrum tracyi</i> Tracy's woolly-stars G3 S3.2	Dry gravelly to loamy soils on flats and benches; closed cone pine forests or chaparral; 1,000-4,300 feet elev. Klamath Ranges, Cascades, Seirra Nevada, Interior Coast Ranges. No closed cone pine or chaparral known in project area.	N
<i>Eriogonum ursinum</i> var. <i>erubescens</i> Blushing wild buckwheat G3G4T2 S2.3 1B.3	Rocky openings on open ridgelines in the Klamath Range; 5300-6200 feet elev.	Y
<i>Eucephalis vialis</i> Wayside aster G3 S1, 1B.2	Gravelly/grassy areas, roadsides in montane conifer/ oak woodland. 2990'-5070' feet elev. No roads or coastal habitat in project area.	N
<i>Frasera umpquaensis</i> (= <i>Swertia fastigiata</i>) Umpqua green gentian G3Q S2.2 2.2	Cool, moist Douglas-fir/white fir forest margins or openings; 5000-6000 feet elev. South Fork Mountain, Trinity Co., & SW OR. Out of geographic range.	N
<i>Harmonia doris-nilesiae</i> Niles' madia G2 S1.1 2B.2	Rocky ultramafic ridgetops & slopes with Jeffrey pine, gray pine, & shrubs. 2100-5500 feet elev. Rattlesnake Creek Terrane (M261Au) of southern Klamath Ranges south of Hwy 299. Out of geographic range.	N
<i>Harmonia stebbinsii</i> Stebbins' madia	Rocky ultramafic semi-barrens with Jeffery Pine, gray pine & shrubs. Southern Klamath Ranges & inner North Coast Ranges. Out of geographic range.	N
<i>Iliamna latibracteata</i> California globe mallow G3 S2.2 1B.2	Conifer forest and streamsides in the Klamath Range. 1600 – 6600 feet. South Fork Mountain.	Y
<i>Ivesia pickeringii</i> Pickering's ivesia G2 S2.2	Ephemeral drainages & seasonally wet grassy slopes in mixed conifer forest, on ultramafic soils; 2500-4500 feet elev. Scott Mountain & Trinity Mtns.	Y
<i>Leptosiphon nuttallii</i> ssp.	Jeffrey pine/incense cedar forest, usually	N

Species	Habitat & Rationale for Eliminating From Consideration	Potential for Presence in Project Area
<i>howellii</i> (= <i>Linanthus n. ssp. h.</i>) Tedoc Mountain linanthus G5T1 S1.2	on ultramafic soil; 4000-5000 feet elev. Localized around the base of Tedoc Mountain, Tehama Co. Out of geographic range.	
<i>Lewisia kelloggii ssp. hutchisonii</i> Sierra Valley lewisia G4T2T3 S2S3 3.3	Decomposed granite, slate, volcanic rubble, conifer forests; 5900-7000 feet elev. Klamath Ranges and Northern Sierra Nevada Mountains	Y
<i>Minuartia rosei</i> Peanut sandwort G3 S3.2 4.2	Gravelly serpentine barrens & openings in Jeffrey pine/mixed conifer forest. 2500-5800 feet elev. Rattlesnake Creek Terrane (M261Au) of southern Klamath Ranges. Out of geographic range.	N
<i>Minuartia stolonifera</i> Scott Mountain sandwort G1 S1.3 1B.3	Rocky slopes on ultramafic soils; montane mixed conifer forest; 4100-5300 feet elev. Scott Mountain. Out of geographic range.	N
<i>Parnassia cirrata</i> var. <i>intermedia</i> Fringed grass-of-Parnassus G5T2T3 S2 2.2	Wet areas, lake edges in ultramafic soils. Below 9600 feet elev. Klamath Ranges.	Y
<i>Penstemon tracyi</i> Trinity penstemon G1 S2.2 1B.2	Rocky outcrops. Majority of sites restricted to Trinity Alps Wilderness, Northern Trinity Co.	Y
<i>Phacelia greenei</i> Scott Valley phacelia G2 S2.2 1B.3	Gravelly serpentinized slopes & forest openings; 5000-7000 feet elev. Scott Mountain. Out of geographic range.	N
<i>Pinus albicaulis</i> Whitebark Pine ***no rankings available	Dry, Rocky Mountainsides; subalpine and alpine zones. 5575-12,150 feet elev. Trinity Alps Wilderness, Scott Mountain, Eddys, and Mt. Shasta	Y
<i>Raillardella pringlei</i> Showy raillardella G2 S2.2 1B.2	Wet ultramafic meadows, seeps and streambanks; 4000-7500 feet elev. Klamath Ranges.	Y
<i>Sedum paradisum</i> Canyon Creek stonecrop G4G5T1 S1.2 1B.3	Rocky outcrops in forest or woodland openings; 960-6500 feet elev. Southern Klamath Ranges of CA.	Y
<i>Silene salmonacea</i> Klamath Mountain Catchfly G1G2 S1S2.2 1B.3	Openings in middle to late seral conifer or mixed conifer-oak forests with patch shrub understory; sometimes on	N

Species	Habitat & Rationale for Eliminating From Consideration	Potential for Presence in Project Area
	ultramaphics, road cuts. Eastern Trinity Co. Out of geographic range.	
<i>Streptanthus oblongeolatus</i> Trinity River Jewelflower G1 S1 1B	Cismontane woodlands on steep metavolcanic bluffs; road cuts on SR299. Along Trinity River gorge above confluence with New River.	Y
Forest Plan Endemics		
<i>Arnica venosa</i> veiny arnica G3 S3.2	Mixed conifer or conifer/oak forest, especially on ridgetops & old road cuts. 2000-5200 feet elev. Eastern Trinity & Shasta Cos. Out of geographic range.	N
<i>Ericameria ophitidis</i> (= <i>Haplopappus ophitidis</i>) serpentine goldenbush G3 S3.3	Serpentine semi-barrens or openings in Jeffrey pine-incense cedar woodland. 2600-5600 feet elev. Rattlesnake Creek Terrane (M261Au) of southern Klamath Ranges south of Hwy 299. Out of geographic range.	N
<i>Eriogonum libertini</i> Dubakella Mountain buckwheat G3 S3.2	Openings in Jeffrey pine-incense cedar woodland or chaparral, always on ultramafic soils; 2500-5500 feet elev. Rattlesnake Creek Terrane (M261Au) & Chancelulla Peaks of the southern Klamath Ranges Out of geographic range.	N
Bryophytes – Sensitive		
<i>Buxbaumia viridis</i> bug-on-a-stick (moss) G3G4	Large diameter, advanced decay logs in riparian habitat in conifer forest. Low elevation to alpine.	Y
<i>Mielichhoferia elongata</i> copper moss G4 S2	Exposed soil or rock containing copper minerals (in this area). Roadcuts. All elevations. No soils with copper minerals present.	N
Fungi – Sensitive		
<i>Boletus pulcherrimus</i> red-pored bolete G2G3 S2	Coastal mature or late-seral Douglas-fir forest with hardwoods. No coastally-influenced plant communities.	N
<i>Cudonia monticola</i> G3 S1	On spruce needle mats and coniferous debris in perennially moist, shady late-seral forest. All elevations. No spruce	N

Species	Habitat & Rationale for Eliminating From Consideration	Potential for Presence in Project Area
	present.	
<i>Dendrocollybia racemosa</i> branched collybia G2G3 S1S2	Nutrient rich leaf mulch or decaying fungi in conifer forest; all elevations.	Y
<i>Phaeocollybia olivacea</i> olive phaeocollybia G2 S2	Mixed conifer forest containing oak or pine. All elevations.	Y
<i>Sowerbyella rhenana</i> orange-peel fungus G3G4 S2	Duff of moist, undisturbed, older conifer forest. All elevations.	Y
Lichens – Sensitive		
<i>Peltigera gowardii</i> Goward's water fan G3G5	Rocks in cool water, perennial, mountain streams.	Y
<i>Sulcaria badia</i> bay horsehair lichen G3 S2S3.2	Open white oak grassland or mature Douglas-oak forest with a black oak component, growing in tree canopy. Below 3000 feet in western Trinity County.	Y

Appendix B. Global and California Rare Plant Ranking

The *global rank* (G-rank) is a reflection of the overall status of an element throughout its global range. Both Global and State ranks represent a letter+number score that reflects a combination of Rarity, Threat and Trend factors, with weighting being heavier on Rarity than the other two.

Species or Natural Community Level

- **G1 = Critically Imperiled** — At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.
- **G2 = Imperiled** — At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.
- **G3 = Vulnerable** — At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.
- **G4 = Apparently Secure** — Uncommon but not rare; some cause for long-term concern due to declines or other factors.
- **G5 = Demonstrably Secure** — Common; widespread and abundant.

Subspecies Level

Subspecies receive a **T-rank** attached is ranked G2T1. The G-rank refers to the whole species range i.e., *Chorizanthe robusta*. The T-rank refers only to the global condition of var. *hartwegii*.

State Ranking

The *state rank* (S-rank) is assigned much the same way as the global rank, but state ranks refer to the imperilment status only within California's state boundaries.

- **S1 = Critically Imperiled** — Critically imperiled in the state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province.
- **S2 = Imperiled** — Imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province.
- **S3 = Vulnerable** — Vulnerable in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
- **S4 = Apparently Secure** — Uncommon but not rare; some cause for long-term concern due to declines or other factors.
- **S5 = Secure** — Common, widespread, and abundant in the state.

Notes:

- Other considerations used when ranking a species or natural community include the pattern of distribution of the element on the landscape, fragmentation of the population/stands, and historical extent as compared to its modern range. It is important to take a **bird's eye or aerial view** when ranking sensitive elements rather than simply counting element occurrences.
- Uncertainty about the rank of an element is expressed in two major ways:
 - By expressing the ranks as a **range** of values: e.g., S2S3 means the rank is somewhere between S2 and S3.
 - By adding a ? to the rank: e.g., S2? This represents more certainty than S2S3, but less certainty than S2.
- Other symbols:
 - GH - All sites are **historical**; the element has not been seen for at least 20 years, but suitable habitat still exists (SH = All California sites are historical).
 - GX - All sites are **extirpated**; this element is extinct in the wild (SX = All California sites are extirpated).
 - GXC - Extinct in the wild; exists in cultivation.
 - G1Q - The element is very rare, but there are **taxonomic questions** associated with it.
 - T - Rank applies to a subspecies or variety.

California Native Plant Society (CNPS) INVENTORY RANKING

CNPS has created six California Rare Plant Ranks (CRPR) in an effort to categorize degrees of concern. They are described as follows:

CRPR 1A: Plants Presumed Extirpated in California and Either Rare or Extinct Elsewhere

CRPR 1B: Plants Rare, Threatened, or Endangered in California and Elsewhere

CRPR 2A: Plants Presumed Extirpated in California, But More Common Elsewhere

CRPR 2B: Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere

CRPR 3: Plants about Which More Information is Needed - A Review List

CRPR 4: Plants of Limited Distribution - A Watch List

CNPS Threat Rank

The CNPS Threat Rank is an extension added onto the California Rare Plant Rank and designates the level of threats by a 1 to 3 ranking with 1 being the most threatened and 3 being the least threatened:

- 0.1-Seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat)
- 0.2-Moderately threatened in California (20-80% occurrences threatened / moderate degree and immediacy of threat)
- 0.3-Not very threatened in California (<20% of occurrences threatened / low degree and immediacy of threat or no current threats known)

Supplemental Botanical Report

Introduction

Purpose

The purpose of this report is to describe management direction and address potential impacts of the Trinity Alps Wilderness Prescribed Fire Project for species other than Threatened, Endangered, and Sensitive.

Summary of botanical concerns for the Trinity Alps Wilderness Prescribed Fire Project; other than those addressed in the attached Biological Evaluation:

1. Forest Plan Endemics
2. Survey and Manage Species
3. Watch List Species
4. Noxious Weeds

Current Management Direction and Affected Environment

Forest Plan Endemic Species

Endemic species are rare species that are confined wholly to a localized geographic area. Forest Plan Endemics are rare endemic species confined wholly or mostly to the Shasta-Trinity National Forest and management direction is described for them in the Land and Resource Management Plan.²⁸ Forest Plan Endemics are afforded the same conservation and protection measures as Sensitive species.

There is no suitable habitat for any of the three Forest Plan Endemic species that are known to occur on the west side of the Shasta-Trinity NF: veiny arnica (*Arnica venosa*), serpentine goldenbush (*Ericameria ophitidis*), or Dubakella Mountain buckwheat (*Eriogonum libertini*), within the Trinity Alps Wilderness Prescribed Fire Project area. For selection criteria refer to Appendix A. These species will not be further discussed in this report.

Survey & Manage Vascular Plants, Bryophytes, Lichens, and Fungi

The Survey and Manage program is a set of standards and guidelines for management of old growth associated species, first set forth in the 1994 Record of Decision (ROD) for Amendments to Forest Service (FS) and Bureau of Land Management (BLM) Planning Documents within the Range of the North Spotted Owl (called the Northwest Forest Plan, NWFP), which was incorporated into the Forest Plan.

Currently applicable survey and manage guidelines are documented in the January 2001 Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines. These standards and guidelines are applicable to Forest Service and Bureau of Land Management lands in western Washington, western Oregon, and northwestern California

²⁸ USDA Forest Service 1995

and are intended to reduce or eliminate (mitigate) potential effects from agency actions to just over 300 species of mosses, liverworts, fungi, lichens, and vascular plants, slugs, snails, salamanders, great gray owl, and red tree voles. These Survey and Manage species are assigned to one of six categories based upon the relative rarity of the species, and the practicality of conducting pre-disturbance surveys (USDA and USDI 2001.)

Four exempted habitat disturbing activities, or projects, are in place from the October 11, 2006 modified injunction order in *Northwest Ecosystem Alliance v. Rey* (Case 2:04-cv-00844-MJP, Doc. No. 109). Thus, these exempted activities (listed below) can proceed and do not require surveys.

1. Replacing culverts on roads that are in use and part of the road system, and removing culverts if the road is temporary or to be decommissioned;
2. Thinning projects in stands less than 80 years old;
3. Riparian and stream improvements projects where the riparian work is riparian planting, obtaining material for placing in-stream, and road or trail decommissioning; and where the stream improvement work is the placement large wood, channel and floodplain reconstruction, or removal of channel diversions;
4. The portions of projects involving hazardous fuel treatments where prescribed fire is applied. Any portion of a hazardous fuel treatment project involving commercial logging will remain subject to survey and manage requirements except for thinning of stands younger than 80 years old.

The proposed activities of maintaining trails and firelines along with aerial ignitions into the project area qualify for using this fourth exemption.

The 2001 ROD requires management of known sites of Category A, B, or E species and high-priority sites of Category C or D species. There are no known or documented sites of survey & manage species within the project area at the time of this analysis.

Vascular plant survey and manage species with potential suitable habitat within the project area include *Cypripedium fasciculatum*, *Cypripedium montanum*, *Ptilidium californicum*, *Botrychium minganense*, and *Botrychium montanum*. All but *Ptilidium* are also Forest Service Sensitive species and are analyzed in the BE portion of this report. Additionally, any potential survey and manage fungi species that are present but currently unknown would experience similar effects as those fungi species analyzed within the BE portion of the report.

Pacific fuzzwort (*Ptilidium californicum*) – PTCA5

This liverwort is known from the west coast of the U.S. and mainly occurs in California. It is strongly associated with late-successional or ‘old growth’ stands of white fir, red fir, and Douglas-fir, specifically those classified as old-growth or second-growth stands with legacy components (USDA Forest Service 2012). It is often epiphytic on trees, fallen and decaying logs, and stumps and can occur at elevations from 3,800 to 6,000 feet. CNDDDB shows 177 occurrences of this species within California. NRIS shows 71 occurrences of Pacific fuzzwort on the Shasta-Trinity National Forest. Noted potential threats to this species include intensive logging and wildfire.

Specific Populations within/near the Project Area: There are no known populations of Pacific fuzzwort located within the project area however potential suitable habitat does exist. The closest occurrences of Pacific fuzzwort to the project area are approximately two miles to the southwest near Onion Camp.

Direct, Indirect and Cumulative Effects

All potential effects to Pacific fuzzwort for the alternatives are the same as those discussed in the late-successional coniferous forest plant guild analysis within this report. Please refer to that section for further information.

As with all previously analyzed botanical species, the Trinity Alps Wilderness Prescribed Fire Project incorporates project design features that meet the management recommendations for conserving habitat which could support these Survey & Manage species habitat in the following ways:

- No new fire line would be constructed.
- To minimize the potential for cumulative affects to botanical species when underburning, no more than ten percent of a sixth-field watershed would be burned in any one year.
- Broadcast and underburn prescribed fire would not be ignited within riparian reserves. Fire would be allowed to back into riparian reserves to promote a low-intensity backing fire.
- Retain existing down coarse woody debris (CWD) whenever possible, providing the amount of logs does not exceed fuel management objectives. At least 5 logs per acre should be retained, with 4 to 8 tons/acre of fuel remaining.
 - This would aid in providing nutrients to plant species and host logs for species such as bug-on-a-stick.
- Retain at least 50 percent duff and litter cover over the treatment area. If the soil and potential natural plant community are not capable of producing cover over 50 percent of the area, adjust minimum amounts to reflect potential soil and vegetation capacity.

Watchlist Species

Watchlist species are those which do not meet the criteria to be included on the Regional Forester's sensitive plant list, but are of sufficient local viability concern to be considered in the planning process.

CNPS online databases, Forest GIS data, and Forest personnel were accessed to determine if any plant or fungi species not already appearing on the Sensitive or Survey and Manage lists should be considered for this analysis. Criteria for selection were as follows: known occurrences must be within proposed treatment units, occurrence information must be more recent than 1971 (i.e. within the past 30 years), and the species should rate as either CNPS list 1B (Plants Rare, Threatened, or Endangered in California and Elsewhere) or 2 (Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere) status. Using these criteria, and local expertise of Forest botanical staff, there is one watchlist species identified for this project.

English Peak greenbriar (*Smilax jamesii*) is a vining perennial that occupies moist riparian areas including lakesides, stream banks, alder thickets, and wet slopes in montane forest. Its rank is G2/S2.3, 1B.3 and is known only from California and Oregon. Its current distribution is throughout the Klamath and Coast Ranges of northern California between 4,000 and 8,000 feet elevation.

Known threats include logging, mining, trampling, power lines, and fuels reduction. There are 34 known populations on the Shasta-Trinity National Forest, 23 of which are in Trinity County, and more are suspected to be present - especially in the Trinity Alps Wilderness. The closest known occurrence to the project area is approximately 19 miles to the east near Horseshoe Lake.

There are approximately 115 acres of perennial riparian-related vegetation types modeled within the entire project area. Sixty-one of these acres (53 percent) are modeled as non-stocked from previous fires. Less than one acre (in either alternative) modeled for passive crown fire or high fireline intensity, and two acres are modeled for moderate fireline intensity. Although the effects to this habitat were major from past fire events, the two action alternatives would, in combination, only minimally increase the potential for adverse effects to these species.

Conclusion: Based on the lack of field surveys and the presence of suitable habitat, it is my determination that either action alternative may affect individuals, but is not likely to result in a trend toward Sensitive listing or loss of viability for English Peak greenbriar.

Weed Risk Assessment

This weed risk assessment analyzes the effects of the proposed project on Shasta-Trinity National Forest listed non-native invasive botanical species or noxious weeds—hereafter referred to in this report as ‘weeds’—within the project area analysis boundaries. The Shasta-Trinity National Forest has placed a high priority on management of non-native invasive species, which includes reducing management related introduction and spread of weeds on the Forest (USDA Forest Service 2011). The purpose of this document is to evaluate the Trinity Alps Wilderness Prescribed Fire Project in sufficient detail to determine its effects on weed species. This Risk Assessment follows the standards established in the Forest Service Manual direction (USDA Forest Service 2011).

Current Policy and Management Direction

Current management direction for management of noxious weeds is given in FS Manual 2900, amendment No. 2900-2011-1, and effective 12-05-11²⁹. Relevant policy is excerpted below:

(2904.08) - The responsibility of district rangers is to:

4. Prevent the introduction and establishment, as well as providing for the containment and suppression, of aquatic and terrestrial invasive species, and coordinating with State and local agencies, Tribes, and landowners in the prevention, control, and restoration efforts associated with the management of invasive species. Outbreaks and newly detected infestations should be reported promptly.

7. Implement the elements, activities, and measures associated with invasive species management in Forest Land and Resource Management plans, Forest Environmental Management System plans, and other resource management and project-level plans.

8. Determine the risk of invasive species introduction or spread as part of the project planning and analysis process for proposed actions, especially for ground disturbing and site altering activities, and public use activities.

12. Issue orders, rules, or other regulations under the authority of 36 CFR (Parts 221, 222, 228, 241, 251, 261, 290, 292, 293, 296, and 297), Departmental Regulation 1512-1, and consistent with national or regional policy, to prevent and control the introduction and spread of aquatic and terrestrial invasive species (including noxious weeds), when necessary.

14. Ensure that contracts and permits contain clauses and specifications requiring the implementation of measures to prevent, control, and/or contain aquatic or terrestrial invasive species (including noxious weeds) and restoration measures to offset associated impacts. Oversee contract and permit administration to ensure compliance with the invasive species provisions.

The Forest Service is obligated by law, and regulations such as Executive Order 13112, to respond to invasive species that threaten terrestrial and aquatic resources of the National Forest System and to collaborate with Federal, State, and local partners to address invasive species that can spread from adjacent lands. Forest Service policy for invasive species management and research was updated in 2013 by direction provided in Forest Service Manual (FSM) 2900 and by directions provided in FSMs 3400 and 4000.

The Northern Province Noxious and Invasive Weeds Program Strategy (2001)³⁰ also directs laws, policy and management direction for land managers at the Shasta Trinity National Forest.

²⁹ USDA Forest Service 2011

³⁰ USDA Forest Service 2001a

Data Sources, Methodology, and Terminology

In California, biologists of the California Department of Food and Agriculture recommend plants for listing. If a plant is found to be "troublesome, aggressive, intrusive, detrimental, or destructive to agriculture, silviculture, or important native species, and difficult to control or eradicate", the Department will designate the plant as a noxious weed.

At the time that CDFA lists a species, it also receives a rating of A, B, C, D, or Q (see Table 8). These ratings reflect CDFA's view of the statewide importance of the pest, the likelihood that eradication or control efforts would be successful, and the present distribution of the pest within the state.

Table 8. Noxious weed rating systems.

CDFA Rankings	Cal-IPC Rankings
A – Eradication, containment, rejection, or other holding action at the state-county level. Quarantine interceptions to be rejected or treated at any point in the state.	High – These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically.
B – Eradication, containment, control or other holding action at the discretion of the commissioner.	Moderate – These species have substantial and apparent, but generally not severe, ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.
C – State endorsed holding action and eradication only when found in a nursery; action to retard spread outside of nurseries at the discretion of the commissioner; reject only when found in a cropseed for planting or at the discretion of the commissioner.	Limited – These species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.

Information on weed presence and abundance was documented with information from Natural Resources Information Systems (NRIS), California Invasive Plant Council (Cal-IPC), California Department of Food and Agriculture (CDFA), GIS analysis, and personal communication with the District botanist.

The Shasta-Trinity National Forest has a list of weeds that are being tracked and managed (USDA Forest Service 2013b) with priority ratings. A high priority weed species is one that is of important local management concern because of its currently limited distribution on the Forest, highly invasive nature, and demonstrated potential to displace large geographic areas of native plant communities. For this project, the risk analysis will only evaluate the likelihood for introducing and spreading high priority and moderate priority species. The low priority species present in the project area will not be considered in the analysis because they are of lesser concern on the Forest and are not considered an issue locally.

Risk Factors Analyzed

Factors such as: 1) Known weed occurrences, 2) Habitat vulnerability, 3) Non-project dependent vectors, 4) Habitat alteration expected as a result of the project, and 4) Increased vectors as a result of the project are considered when assessing the risk of weed invasion or expansion. These factors are incorporated into the following effects analysis.

Resource Concerns and Measurement Indicators

No alternative-driving issues specifically related to weeds were identified through public scoping. One concern related to weeds was identified by the District Botanist through internal analysis. The concern and related measurement indicator is as follows:

Resource Concern: Effects of the proposed action on weed introduction and spread

Measurement Indicators: The risk of introducing and/or spreading weed species measured by a rating of high, moderate, or low.

Affected Environment

The New River Watershed Analysis³¹ identified the following five weed species within the watershed in which the project area lies: Dalmation toadflax, Bull thistle, Klamath weed, Yellow star-thistle, and Dyer's woad. These five species were identified as having potential to encroach upon presently uninfested areas.

Field inventory surveys within the project area were performed by FS botany technicians and a wilderness ranger in 2012. The New River, Slide Creek, and Battle Creek trails were visited. Additionally, the Burned Area Emergency Response (BAER) report for the 2013 Corral fire in the westernmost portion of the project area noted several weed species but highlighted two in particular—klamathweed and yellow star-thistle—as weed species of concern for expansion within the fire perimeter. No BAER data was available for the 2015 River Complex fire which overlaps the southern portion of the project area at the time of this writing.

³¹ USDA Forest Service 2000

Table 9. Weed species known or suspected within Trinity Alps Wilderness Prescribed Fire Project boundary

Species Common Name	Species Scientific Name	Priority Ranking	In 2000 New River WA	Found in 2012 Botanical Surveys	In 2013 Corral Fire Perimeter
bigleaf periwinkle	<i>Vinca major</i>	Low		Yes (2)	-
bull thistle	<i>Cirsium vulgare</i>	Low	Yes	Yes (8)	Yes
common mullein	<i>Verbascum thapsus</i>	Low	-	Yes (1)	Yes
Dalmation toadflax	<i>Linaria dalmatica</i>	Moderate	Yes	-	-
Dyer's woad	<i>Isatis tinctoria</i>	Moderate	Yes	-	-
French broom	<i>Genista monspessulana</i>	Moderate	-	-	Yes
klamathweed	<i>Hypericum perforatum</i>	Low	Yes	Yes (27)	Yes
Armenian blackberry	<i>Rubus armeniacus</i>	Low	-	Yes (1)	Yes
oxeye daisy	<i>Leucanthemum vulgare</i>	Low	-	Yes (1)	-
perennial pea	<i>Lathyrus latifolius</i>	Low	-	Yes (2)	-
prickly lettuce	<i>Lactuca seriola</i>	Low	-	Yes (1)	-
Scotch broom	<i>Cytisus scoparius</i>	Moderate	-	-	Yes
Yellow star- thistle	<i>Centaurea solstitialis</i>	Moderate	Yes	-	Yes

Noxious Weed Species Accounts^{32 33 34 35 36}

Dalmation toadflax (*Linaria dalmatica*) – This perennial herb is rated as moderately invasive by Cal-IPC and as class A by CDFA. Dalmation toadflax can be found throughout California in cool, semi-arid climates on dry coarse soils. Plants are widely naturalized on disturbed soils. No occurrences of dyer's woad are mapped within the project boundary. The closest documented occurrence is approximately 13 miles to the southwest.

Dyer's woad (*Isatis tinctoria*) – This perennial herb is rated as moderately invasive by Cal-IPC and as class B by CDFA. Dyer's woad can be found throughout most ecosystems in Northern California on dry, rocky, or sandy soils below 3,000 feet elevation. Plants are highly competitive and often grow in dense colonies. Although no occurrences of dyer's woad are mapped within the project boundary there are three occurrences within 3 miles of the project boundary.

³² Hickman 1993

³³ Bossard et al. 2000

³⁴ Cal-IPC 2006

³⁵ DiTomaso and Healy 2007

³⁶ CDFA 2011

French broom (*Genista monspessulana*) – CDFA classifies this perennial shrub as a Noxious Weed List C and Cal-IPC considers it highly invasive. French broom is common below 1,600 feet elevation throughout California (mainly coastal counties). There are no documented occurrences of this plant within the project boundary or within 3 miles.

Scotch broom (*Cytisus scoparius*) – This perennial shrub is rated as highly invasive by Cal-IPC and as class C by CDFA. Scotch broom is common below 3,300 feet elevation throughout northern California. It spreads through prodigious seed production and may be commonly found in disturbed areas such as road cuts and forest clear cuts but may also reside in undisturbed communities such as oak woodlands, or grasslands. Although no occurrences of Scotch broom are mapped within the project boundary there is one documented within one mile of the boundary.

Yellow star-thistle (*Centaurea solstitialis*) Yellow star thistle invades 12 million acres in California, is considered highly invasive by Cal-IPC, is on the Noxious Weed List C (control required in nurseries, not required elsewhere) by CDFA, and is of very high concern on the Shasta-Trinity National Forest. A county-by-county comparison between 1985 and 2002 showed increases in yellow star-thistle in all regions of California except for the farther northeast and southeast areas. In Shasta County alone there has been a 25% increase in gross acreage of yellow star thistle occurrence from 1985 to 2002. Although no occurrences of yellow star-thistle are mapped within the project boundary there are seven documented within three miles of the boundary.

Environmental Consequences

Alternative 1 - No Action

Implementation of the No Action alternative would result in no increase in suitable habitat for weeds from project related activities. Suitable habitat for weeds decreases with full canopy closure. Lack of disturbance and maintenance of the canopy would continue to discourage the establishment of weeds, allowing native species to occupy the majority of habitat in the project area. Other factors that contribute to introduction and establishment of weeds, such as recreational use of trails, streams, and other sites in the area, transport of invasive seeds on stock/pack animals being utilized in the project area, spread of existing nearby (10-20 miles away) weed populations, and potential wildfires would continue. In the event of a wildfire, approximately 21,443 acres (37 percent of the area) is modeled for very high flame lengths, and 2,774 acres (five percent of the area) is modeled for active crown fire. High severity effects from wildfire would create a high-to-moderate vulnerability of habitat to invasion by weeds. Additionally, non-project dependent vectors, such as fire suppression actions (e.g. dozer line creation, heavy ground-based machinery use, etc.) highly increase the risk of invasion. Due to the low level of weeds present in the area, however, the overall risk from this alternative is moderate.

Effects Common to Both Action Alternatives

Weed habitat can be created when competing vegetation is removed and bare soil is exposed, thus accelerating water loss. Weeds have developed strategies that allow them to out-compete native species by germinating and occupying terrain faster than native species and also persisting under environmental conditions which may not be as well

tolerated by native species. There are no ground disturbing (i.e. turning up of soil) activities proposed under either action alternative. Prescribed fire, however, would remove vegetation within the project area, creating newly exposed areas for possible infestation or expansion of weeds.

Much of the research conducted on broom (French or Scotch), Dyer's woad, or yellow star-thistle response to fire has been in either grassland and/or chaparral ecosystems^{37 38 39} due to often higher presence of invasive species in these ecosystem types compared to forested areas. The Trinity Alps Wilderness Prescribed Fire Project area has a low percent (approximately 7%) of shrub or grassland areas however these sites, especially those closest to known weed occurrences or trails, would be the most vulnerable to invasion or expansion. Due to the low amount of this habitat, the risk of invasion or expansion is low.

Under the action alternatives, the largest amount of vegetation (and downed fuels) removal would occur in areas predicted to have high fireline intensity or, possibly, areas with moderate intensity or surface fire. The high fireline intensity areas within proposed treatment areas (less than one percent of treatment acres) would increase habitat for weeds. Creation of suitable habitat would increase the potential for chance introductions of new weed species from outside areas. Additionally, areas with high-intensity fire would create localized areas of soil sterilization that can be difficult for native species to recover from. Burning can also reduce the abundance of some invasive species such as Scotch broom or Dyer's woad; however, this is often a temporary condition and would not persist unless followed up with additional treatment. Overall, these treatments would produce a low risk of invasion or expansion of weed occurrences.

Portions of the project area that have the highest likelihood of weed presence include the high-severity portions of past wildfires, existing firelines constructed during past fire events, hiking trails (73 miles – see the project Recreation and Scenery report), mule packer camps, and areas closest to roads near the project area (i.e. the southern portion near the town of Denny). Riparian areas or off-trail areas used by recreationists such as hunters or gold-panners may also have small weed populations due to introduction by human vectors⁴⁰. Due to the remote nature of the project area and the low amount of acres of severely burned patches, this risk is low.

Past actions such as wildfires, hydraulic mining, dredging, and hard rock mining along most riparian channels throughout the 20th century caused ground-disturbance and removal of topsoil within the analysis area⁴¹. This past activity, along with more recent wildfires (e.g. Iron Alps, Backbone, and the River Complex) has created areas where non-native species may proliferate. Current actions that may impact weed populations includes trail maintenance (e.g. removal of brush or logs); however, these activities allow for identification – and possible removal – of these species as a result of Forest personnel presence. The west side Shasta Trinity botany program has set up an invasive weed training program for wilderness rangers and their volunteers since 2012 and has

³⁷ Alexander and D'Antonio 2003

³⁸ Keeley 2006

³⁹ Zouhar 2009

⁴⁰ Pickering and Mount 2010

⁴¹ USDA Forest Service 2000

continued to successfully map and manually pull treatable infestations in the Trinity Alps Wilderness.

Project Design Features that Reduce Potential Impacts from Alternatives 2 and 3

Several project design features have been incorporated to minimize impacts to natural resources within the project area. All of these would reduce impacts from noxious weeds.

- New weed infestations discovered in the project area before or during project implementation would be evaluated by qualified personnel and be either removed, or avoided and use best management practices applicable to prevent spread.
- To minimize the potential for cumulative adverse effects when underburning, no more than ten percent of a sixth-field watershed would be burned in any one year.
- Broadcast and underburn prescribed fire would not be ignited within riparian reserves. Fire would be allowed to back into riparian reserves to promote a low-intensity backing fire.
- No new fire line would be constructed.
- Prescribed fire would be designed to result in a mosaic of low-intensity fire and unchanged vegetation within areas with very low or low burn probabilities with no more than 50% of the area having patches of high or moderate soil burn severities (missing litter or duff) except for highly erodible soils (soils developed from granitic parent material), where ground cover should be in excess of 90% and evenly distributed (LRMP Appendix O).

There would be no appreciable difference regarding the risk of potential weed invasion between the action alternatives. In the short term the additional acres slated for prescribed burning under Alternative 3 could have slightly higher weed risk however due to the decreased potential for severe wildfire effects in these areas, over the long term the risk would slightly decrease.

Conclusion: Alternatives 2 and 3 may contribute additional habitat for weeds in the short term. With the implementation of design features such as: retention existing surface duff, limitations on amount of acreage able to be treated in a single year, and a lack of ground disturbance, the likelihood of invasion by weeds would be minimized. Overall, the risk of invasion or expansion of weeds within the project area from the implementation of either action alternative is low.

Alternatives Comparison Summary

The following table shows Resource analysis indicators and measures comparisons across all alternatives.

Table 10. Resource analysis indicators and measures by alternative

Analysis Indicator	Measure	Alternative 1	Alternative 2	Alternative 3
Effects of the proposed action on noxious weed introduction and spread Measurement Indicators:	The risk of introducing and/or spreading non-native invasive species measured by a rating of high, moderate, or low.	No direct, indirect, or cumulative effects due to no action. Moderate risk of introducing and/or spreading non-native invasive species in the event of severe wildfires (and related suppression activities).	Effects from this alternative would result in low-to-moderate risk of introducing and/or spreading non-native invasive species from project implementation.	Effects from this alternative would result in low-to-moderate risk of introducing and/or spreading non-native invasive species from project implementation..

Overall level of risk for the project

When project design features are applied, the overall level of risk for the project is **low-to-moderate**. This is mainly due to the lack of recent weeds survey information to fully assess the weeds condition within all portions of the project area. Resource protection measures (RPMs) will be effective at decreasing the risk of invasive weed spread.

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